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ON

REGIMEN

AND

LONGEVITY:

COMPRISING

MATERIA ALIMENTARIA, NATIONAL DIETETIC USAGES
AND THE INFLUENCE OF CIVILIZATION ON
HEALTH AND THE DURATION OF LIFE.

BY
JOHN BELL, M. D.,
Lecturer on Materia Medica, Fellow of the College of Physicians of Philadelphia,
Member of the American Philosophical Society, &c. &c.

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PREFACE.

Although addressing himself chiefly to the general reader, in the present work, its author has not forgotten the advantages of a treatise on dietetic regimen to the physician. The subject is, confessedly, one of interest to all, and on which all ought to have an accurate knowledge, at least of its main principles and their more immediate personal application. It has been the aim of the author to collect and arrange more abundant and diversified materials, in order to guide his readers to a proper conclusion, than are met with in books on regimen. In place of fixing attention on the precise weight and measure of every article of food as it is brought to the table, and prescribing rigidly the allowance to the invalid, he has extended the range of observation and inquiry, and showed how entire nations have lived and thrived on the very substance about which there was so much medico-culinary consultation and speculation. He has preferred setting forth the conditions and attainable means by which communities are kept in health, and longevity attained, to minute specifications of the arts by which a luxurious and pampered individual may compromise between his appetites and his health, and procure enjoyment, if it were possible, without complying with the laws through which alone it is pro-

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curable. But, although the lesson be not specially directed to the invalid, it is so contrived as to reach his wants and strengthen his convictions of what is proper. Thus, in describing the several vegetable substances used for food and their competency to impart abundant nutriment to large masses, if not the entire population of a country, the author, in these pages, hopes to carry persuasion to the mind of an invalid, or sick person, of their dietetical importance in his own case, better than if the opinions of Hippocrates or Celsus, of Rush or Physick were repeated most impressively in their favour. An enlarged knowledge, such as that furnished by a view of National Dietetic Usages and of the wide geographical range and cultivation for food of various vegetable substances, will, it is believed, serve to dispel certain prejudices against some articles, on the regular and continued use of which, for a period of more or less duration, the restoration to health of the invalid and the sick will greatly depend, more, indeed, than on medicines, however skilfully prescribed and punctually and affectionately administered. Both physician and patient will, he believes, give the author some credit for his pains-taking in this respect.

But, as already intimated, he does not profess to deal in specialties; his ambition is to influence the community at large, and particularly the young and inquiring, whose habits are not yet formed. For this purpose, he has placed before them a series of facts, on the dietetic usages of both ancient and modern nations, and on the alimentary value and amount of the substances used for food in nearly all parts of the inhabited globe. Details of this nature are part of the physical history of man, which ought to precede the study of his general or politico-civil history. They might

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be much more carefully and accurately interwoven with geographical descriptions than they are, and in this way the truths of both would be impressed durably and pleasurably on the minds of the young.

The production and suitable supply of food, particularly of that which is the produce of the soil, are subjects of multifarious interest and application. They concern the physician, who sees in years of scarcity and famine years of pestilence; they concern also the political economist, and the moralist and divine, the first of whom notes the fluctuations, the increase and decrease of population corresponding with, because caused by, the alternations of abundance and scarcity of food; while the last are enabled to trace public tumults and private disorder, breaches of the social compact, recklessness and violence against property and person, to the gnawing of hunger, and the wretchedness of despair which comes over the destitute and the starved. How insufficient if not powerless must be the skill of the physician, the science of the economist, or the pious zeal of the preacher, if only directed to the relief or amendment of individuals, when the general causes are committing their havoc on the masses. On a subject of so much common interest, not only to the thoughtful and professional few, but to mankind everywhere, it is desirable that each should contribute his share of information towards increasing the means of physical comfort, which has so close a connection with moral and social well-being and well-doing. The question in its main aspect is, as yet, one of comparatively speculative inquiry in the United States; but, with our rapidly increasing population, it must soon assume its full practical importance; and then wo, if, with the example of warn-

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ing at least before us in the old world, we are not prepared for the emergency better than they have been.

There is, and has been for some time, a state of things among us which, although not interfering to a destructive extent with our alimentary support, has most ruinously with public and individual health and economy. It is equivalent to a protracted war, to a continually recurring or rather never ceasing epidemic: and, like these scourges of mankind, it both depopulates and demoralizes. As such it would seem to call more especially for the intervention of the healing art; but as a mixed evil, being both physical and moral in its origin, as it is in its spread and effects, it can only be stayed by the joint counsel and sustained action of physician, divine, legislator and political economist,—all of them invoking the people to relieve themselves of the burden, and showing by what means they may succeed. Every reader sees that these remarks are made in reference to the consumption of alcoholic drinks, and to drunkenness and its associations in this country. The author has endeavoured, in this work, to show the extent of the evil, and that its operation is not confined to our own land. Not abroad then must we look for the remedy or the means of reform, nor to the imitation of foreign custom with the inveiglements of poetry and sophism. The cure is with ourselves; happily, also, it is known, and in process of successful operation.

While advocating simplicity, the author also recommends variety in dietetic regimen: he thinks that meat should be sparingly used, but he displays the endless variety of vegetable food, and the prodigal supply of fruits with a luxurious enjoyment in their free use,—in the state in which, by a favouring climate and skilful

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industry, they are met with in nearly all parts of the world. If he has enlarged with apparent disproportion on the subject of fruits, it has been with a hope that the very description of their excellence and abundance in different countries might serve as an incentive to renewed and more extended efforts at home, for the improvement of those now grown and the introduction and successful culture of others. Horticulture, the attendant and embellisher of agriculture, which provides so many palatable and healthful additions to the substantial produce of the field, and correctors of the undue stimulus and acrimony of much animal food, merits all the fostering care which an uncorrupted and yet educated and refined taste has ever extended to it. A well cultivated garden, in due alternation of vegetable, fruit and flower, gives us poetry without its illusions, nature divested of her ruggedness and art of its constraint.

The present work may be considered, in a measure, as a *Materia Alimentaria*, in the description of the several articles of which the author has followed nearly the same order with that adopted by writers on *Materia Medica*. The original locality and the countries where the *cerealia*, *leguminosæ*, and nutritive *tubers*, such as the potato and cassava, and the nutritive and other fruits flourish,—their composition as respects proximate principles, their alimentary value and absolute and relative quantities, produced and available for home and foreign consumption, are duly mentioned. Subsequently will be found the modes of preparation and combination of the chief nutritive grains, for common use and the wants of the invalid.

In sedulously avoiding all needless technicalities, the author has been mindful of the proper expectations of

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the general reader, while at the same time he has not thought himself free to pass over the explanations and illustrations furnished by organic chemistry, which merits a better fate than being thrust away in the farthest corner of our common works on general chemistry, or hurried over as a dispensable appendix to a course of public lectures on the science at large. Its availableness for hygiene will probably be more evident to the student of medicine and the amateur of science, irrespective of profession, than they have hitherto supposed.

The free introduction of statistical calculations into these pages will often give the reader a clearer idea of the alimentary importance and commercial value of certain substances used for food than common notices or even any assertion of their extraordinary dietetic value could convey.

Disposed to give a wide yet not unusual latitude of interpretation to "Regimen," the author would gladly have treated of the other topics which, with his ideas of the subject, come properly under this head. He had even collected materials with a view to their forming a part of the present work. But full and detailed as it is, on one great and important department, and which, in the popular sense, is generally understood to include that which is chiefly meant by regimen, he regrets the less that he must postpone, to a future period, the publication of his observations and reflections on some of its other topics, among which *Air* and *Exercise* will probably be the first discussed.

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REGIMEN

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CHAPTER I.

PUBLIC HYGIÉNE.

Connection between health and longevity, and personal enjoyment and prolonged usefulness—Their importance admitted in all systems of legislation—Mosaic—Mohammedan—Greek, and Roman—Liberty favourable to national health—Examples derived from Palestine, Greece, Italy, Holland—Christian civilization has increased the mean duration of life—Illustrations drawn from Geneva—Mean duration of life—Probability of life.—Reference to ancient Rome—Ancient and modern France contrasted—Also, Great Britain and Russia—Not to confound ingrafted vices with civilization itself—The social and selfish enjoyments in harmony with general and individual health—Malign influence of war on health.

The preservation of his health, and the attainment for himself of longevity, are objects of desire to every man; no matter in what age or country his lot is cast, nor by what arbitrary tenure he holds his life. They are the wish of the master and the slave, of the illiterate and the learned, of the timid Hindoo and the warlike Arab, of the native of New Zealand not less than the inhabitant of New England. An indispensable condition for the greatest and longest enjoyment of the senses and propensities, for the widest range and exercise of intellect and gratification of the sentiments, whether these be

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lofty or ignoble, health, in an especial degree, has ever been a fit subject of contemplation and instruction by the philosopher and legislator. Their advice and edicts on the means of preserving it have frequently been enforced as a part of religious duty; and, at all times, civilization, even in its elementary forms, has been marked by laws on this head. With the numerous and minute hygienic enactments of the great Jewish lawgiver, for the guidance of the people of Israel, we are all familiar. Prompted, we may suppose, in part by the example of Moses, and, also, by considerations growing out of the nature of the climate in which he lived, Mohammed incorporated, with the mingled reveries, ethics, and blasphemies which compose his Koran, dietetic rules and observances of regimen, that are, to this day, implicitly obeyed by his zealous followers. In such a climate as that of Arabia, Syria, and the adjoining countries, can we doubt of the wisdom of that part of his code of health which prohibited the eating of gross animal flesh, such as that of swine, and the drinking of wine. His injunction, to practice repeated ablutions daily, is generally known: and future reward was promised to him, who erected a fountain by the way-side, or otherwise secured the means for the traveller in the desert to slake his thirst with pure water. Can we put in advantageous contrast with this recommendation, the practice so common, and until lately so universal, in nearly all Christian lands, of erecting houses by the way-side, at which the traveller, even when not impelled by depraved appetite, still felt himself under a kind of compulsory obligation to drink of a liquid poison—ardent spirits, whose alcoholic fire is but imperfectly mitigated with water?

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The Greek and Roman legislators prized too highly the lives of the citizens of their respective states, to neglect laws for the preservation of the public health. Solon, by one of his enactments, forbade the exportation of any of the products of the soil, except oil —that being in excess, and to be spared, without endangering an adequate supply of food to the people. There were other laws, regulating entertainments, one clause of which directed that none but mixed or diluted wines should be drunk at banquets; the Areopagites were, also, required to take cognizance of all drunkards. Agriculture, the necessary support of a flourishing state, was invested with a religious character by the Athenians, whose worship of its deities was constant and imposing. The festival in honour of Ceres, in her double capacity of introducer of the cultivation of grain, and as the first who taught mankind the use of laws, was celebrated with peculiar splendour, for a term of three days, in Athens, and in most of the Grecian cities.

In Sparta, the education of the children, which was principally directed to secure to them health and robustness of frame, and their necessary concomitant temperance, was made an affair of the state, with whose regulations no false tenderness of parents was allowed to interfere. In recording this fact, I do not mean, however, to applaud the details of Spartan education; but merely to point out the importance which Lycurgus, and the government after him, attached to the health of the people. Gymnasia originated with the Lacedemonians, but were general in all the Grecian states. In these, the youth were trained, by various exercises of strength and agility, to manly vigour and endurance of the fatigues and perils of war; but it should not be forgotten, that the most celebrated

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gymnasia of Athens—the Lyceum, the Academy, and *Cynosarges*—were severally illustrated and made memorable by the lessons of Aristotle, Plato, and Antisthenes. It was thus that the same youth, who had exercised their bodies at wrestling, running, and throwing the quoit, could acquire immediately afterwards scope and variety of thought, in listening to their teachers of philosophy and ethics.

Rome, however barbarian in her origin, if we can still attach any credit to the tradition palmed on us as the history of her first period, soon acquired, with the arts of the Etruscans, their attention to the public health, manifested, to this day, in the aqueducts and remains of immense sewers, (particularly the *Cloaca Maxima*). The profuse supply of water, by means of the aqueducts, enabled the citizens, not only to gratify all the wants of personal and domestic economy, for drink, culinary purposes, and washing, but also to enjoy regularly a bath, at a cost little more than nominal. Officers (Ediles), high in rank, were appointed to take cognizance of all that could materially affect the public health; viz. in the quantity and quality of provisions, the price of grain, preservation of the sewers, and regulation of the public baths, &c.

Health and longevity are moral and benevolent aims, both because they can be fully procured only by moral and benevolent means, and because they place it more completely in the power of men who enjoy them to carry out the practical lessons of morality and benevolence, for the greatest good of the greatest number, during the longest time. The remark is as applicable to communities as to individuals, to a government as to a whole people. Public and private industry, equal and beneficent laws, by which every citizen is pro-

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tected in the enjoyment of the product of his legitimate labour, are among the primary conditions for procuring these boons. In fact, just so far as men make themselves the agents and exponents of the eternal and immutable laws of an All-wise Providence, just so far will they be successful in their search after health and long life. But let it be remembered, that these laws are of two classes: the one, which represent the operations of external agents, in the air and on the earth, on the human frame; the other, of the working of the mind, in the display of its propensities, its sentiments and its intellect. Between these two classes of laws, both of them laid down by the Creator of all, there is a never-ceasing connection and harmony. No man, who properly directs, for his health, the operation of the air by which he is surrounded, and increases the nutritive products of the earth on which he lives, can therein do a vicious act; no man, who conforms to the lessons of pure morality and religion, can conflict with sound principles of hygiene. So, on the other hand, we cannot but admit, that he infringes on the moral code who voluntarily injures either his own health or his neighbour's; and that there must be something wrong in the religious dogmas of him, whose persuasions and practice are adverse to the general health, or to principles, the application of which conflicts with the health of the greatest number.

Countries once healthy and well governed have, by a change of rulers, become the very reverse. Need we search for a stronger and more melancholy proof of this assertion, than in the altered features of Palestine? Once flowing with milk and honey, its soil yielding grain and fruits adequate to the wants and enjoyments of a crowded population, this doomed land is now

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almost a desert, over which roam the lawless Arabs; whilst the holy city, in decay, is governed by a few insolent Turkish soldiers.

It has been well said, "that general health is inconsistent with extreme servitude." Greece, with the loss of her ancient liberty and the ruin of her flourishing cities, exhibits an altered climate, which her modern renovation under the auspices of freedom may again restore. Spots that were once decorated with temples and groves to Hygeia and Æsculapius, are now shunned as seats of disease. In Italy, the changes have been equally melancholy. Latium, with her hundred cities, is now almost a waste, (the present *Campagna di Roma*) and is so thinly tenanted as barely to suffice for the imperfect cultivation of some spots in grain—the reapers of which becoming sick, in large numbers find a refuge, and many meet their death also, in the great hospital at Rome. Ostia, once a flourishing city, and the seaport of Rome, has now but a few miserable houses; and Ardea, which at one period was able to resist Rome herself, and to send out colonies, has now a population of only six hundred inhabitants. How changed the fate of Magna Græcia, now a part of the kingdom of Naples, to whose people Rome herself was indebted for the elements of science and the budding of her poetry! How few and melancholy the remains of the numerous cities and noble buildings that adorned the coast of the Tyrrhæan sea; and in which Pythagoras taught the lessons of wisdom, and orators dazzled by the splendour of their eloquence! The once flourishing Pæstum, a residence of the Sybarites, enriched by foreign commerce, and embellished by all that art and luxury could devise, was, for a time, after its decay and

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devastation by Saracens and Normans, totally lost to the world. Its discovery only presented the remains of three ruined edifices, with no sound in or around them, save the dashing of the waves against the desert shore, or the rustling of lizards through the branches which intertwine their columns and cover their floors; or, it may be, the flight of birds which occasionally nestle in their ruined pediments. All is desolation! All breathes pestilence!

Taking history as our guide, we discover four distinct periods, during which the face of Italy, and in degree its climate, have undergone great changes; consequent on and commensurate with the difference in the government, and the industry and the intelligence of the people. In the first, Etruria, Latium and Magna Græcia exhibited the pleasing aspect of hundreds of cities, with a rich and thriving population, refined by arts, and united, at least many of them, under imperfect systems of federative government.—Agriculture supported a numerous population, and commerce introduced wealth and the elegancies of life, of which the museums of Europe contain valid proofs at this day, in their numerous vases, urns, &c. Subjugated by the less polished but more warlike Romans, these countries underwent a change, dependent on their loss of liberty. Their cities fell into decay; their rural population was diminished. Again, however, when the Romans became the masters of Italy, and were freed from the fear of wars near home, industry was successfully directed to agriculture; and, to a certain extent, the old cities were replaced, or their diffusive influence partly supplied by Roman colonies. During this second period, the country was like an extensive garden, and, consequently, healthy. A sad

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reverse to this picture was presented in the third period, when, after the repeated incursions of barbarian conquerors and despoilers, and the final dismemberment of the empire, her cities and villas were sacked and burned, her fields and vineyards laid waste, and her population diminished by wars, famine and pestilence. To such a degree of ruin did these causes operate, that, as we learn from the accurate and learned Muratori, in the eighth century a considerable part of Italy was covered with forests and marshes of great extent, and infested with wolves and other wild beasts. The last period, beginning with the revival of letters and commerce and improvement in agriculture, and coming down to the present time, shows a great improvement in the state of the country: districts are now in a high state of cultivation that, in the middle ages, were abandoned, but which, prior to that time had been, as ancient writers represent, very fertile.

Other countries present similar examples to those just related, of desolation produced by the same causes. Africa has not recovered from the devastating shock occasioned by the invasion of the Vandals, and the wars between them and Belisarius, in the reign of Justinian, in which, if we believe the testimony of Procopius, a contemporary writer, not less than five millions of persons lost their lives.

In the history of Holland, the ancient Batavia, we see a remarkable example of the power which a people, when sustained by freedom and stimulated by their very necessities, can exert over the most discouraging impediments of situation and climate. Inhabitants of a barren soil, almost immerged in water, and with an incumbent atmosphere, the most unfriendly to human comfort, the Hollanders, so far from retiring before the

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encroachments of the ocean, erect barriers to restrain its fury, give new channels to their rivers, drain by numerous canals their morasses, and convert as it were, the elements which seemed to be the means of destruction, into so many sources of wealth. But, take from Holland her free institutions, and from her people the conviction that the profits of their labours are not to be diverted to the gratification of the wants and extravagances of domestic tyrants, or to minister to the aggrandizement of foreigners, and, ere long, her dikes will be in decay, and the waters of the ocean and of the rivers overspread her land; poverty will replace wealth, and disease everywhere stalk about in place of the vigorous health, which is now the admiration of the traveller.

In presenting these historical examples of the connection between good government and social order on the one hand, and health and longevity on the other, my object has been to fix the attention on the principle involved. Its confirmation is now placed beyond all doubt, by the results of numerical calculations, of the relative age of persons, in the same countries, and in the same city, at different and remote periods. We learn from those calculations, that with the diffusion of intelligence based on Christian ethics, and a better, though still very imperfect practice of the Christian virtues, in states and communities, and with a greater security of property and person, more certain returns to industry in agriculture, commerce and the arts, better protection against the vicissitudes of weather, and more abundant, and better food than in former times, the average duration of life is greater now, in nearly all civilized countries, than in any antecedent period in the history of the world. In the same country, if there is a difference in

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the longevity, or in the mean duration of the life of certain portions or classes of the people, the advantage will be found entirely on the side of those who enjoy the greatest comforts, who are better lodged and clothed, and better fed, and whose instruction and moral culture are more advanced than the others. Indigence, an evidence of unhappiness, is itself a measure of short life, just as wealth with its accompaniments, if assumed as an evidence of happiness, becomes a measure of longer life. So, conversely, when we meet with a people or a community possessing abundance, we infer that they will enjoy, in the mass, longer lives than another people, or even adjoining community, whose means of support are narrow, and inadequate to the gratification of their reasonable wants. It may comport with the fictions of poetry to speak of the hardy and contented poor man, and of his exemption from the diseases of the wealthy and luxurious; but, in sober fact, he is a greater and more frequent sufferer from disease, and has a shorter tenure of life, than his wealthier neighbour.—A comparison of this nature, on a large scale, based on numerical calculation, has been made by M. Villermé, for France, by which it appears, that in the entire population of that country human life is prolonged twelve years and a half among the wealthy beyond its duration among the poor; the mean duration for the former being forty-two and a half years, for the other only thirty years.

The influence of progressive civilization, in increasing the average duration of human life, has been exhibited of late years by a number of tables of vital statistics. It will be sufficient for my present purpose to introduce in this place, the results of one or two of them—as I shall return to the subject, when I come to treat expressly of longevity. I may mention now for the informa-

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tion of the reader, that when the terms "mean duration of life" are used, we are to understand the mean or average of the number of years which any definite number of persons live. Thus, if we note the duration of life in each, of a thousand individuals, and divide the sum total of these ages by a thousand, we have the figures indicating the mean average duration of life, or the expectation of life in these thousand persons. This does not afford a measure of the longevity to which some of them may have attained, for in a thousand persons, some of whom have passed their ninetieth year for example, the mean duration may be smaller than in another list, none of whom have gone beyond their seventieth year. The mean duration of life is an evidence of the condition and prospects of the masses; and as such it affords a measure of their progressive improvement, or of their deterioration.

In the city of Geneva, of whose population, births and deaths, an accurate account has been kept for nearly the three last centuries, or since 1560, we find a striking illustration of the principle already laid down, viz: the ameliorating influence of civilization in prolonging human life among a people. It appears, from a series of historical and statistical researches made by M. Mallet,* that in Geneva, the mean duration of the lives of the citizens of that republic, from 1560 to 1600, was twenty-one years and two months; I omit the days. In the seventeenth century, or from 1600 to 1700, the mean life was twenty-five years, nine months; and during the period from 1701 to 1760, it had increased to thirty-two years, nine months. This estimate of M. Mallet, strongly as it marks the difference in the duration of human life, in the above periods, is below that of some pre-

* Annales d'Hygiene et de Medecine Legale, tom. xvii.

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ceding writers, who did not make allowances for certain defects and omissions, which he points out, in the official tables. In 1833, the mean duration of life for the people of Geneva was forty years and five months; being nearly twice as long as it was rather more than two centuries before.

If we were to take the *probable life* of the people of Geneva, as explained by M. Mallet, the contrast between their past and their present condition, as regards a greater and more diffused enjoyment of all the means of supporting and prolonging life, will be still more evident. By probable life, or *the probability of life*, M. Mallet and other continental writers understand, the chances of a person reaching a certain year of age, anterior to which one-half of a given number of those born at the same time with himself have died. Thus, of a thousand persons born in a given year, and place, if one half of them die by the expiration of thirty years,—this will be the period of the probable life of the whole number, as the chances or probabilities were equal, that any one of the original number at birth, would die before, or might live to pass this limit of thirty years. Or, we may take a given number of persons at any age, say five years or ten years, and note at what age the number decreases to one-half; then the age at which they so come to one-half is called the probable duration or term of life. Calculations made on this basis by M. Mallet show, that towards the end of the sixteenth century, the probable duration of life for the people of Geneva was only eight years, seven months. In the seventeenth century it was thirteen years, and three months; in the first half of the eighteenth century, or from 1701 to 1750, it was twenty-seven years and nine months; between 1751 to 1800, thirty-

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one years, three months. From 1801 to 1813, the probable term of life had reached forty years, eight months, and in the twenty years, from 1814 to 1833, it was as high as forty-five years, one month. Thus we learn from the preceding proportions that the probability of life at this time in Geneva, is five-fold greater than it was not quite three centuries ago.

If we wish to compare the mean duration of life in modern with that in ancient times we want the requisite data, and are left to conjecture. There is only one document of an authentic kind recorded by Domitius Ulpianus, Secretary to the Emperor Alexander Severus, to which any value can be attached. He relates, that registers of population, age, sex, disease, and death, had been kept by the census from the time of Servius Tullius to Justinian, which includes a period of a thousand years. But it is most probable, that the citizens only of Rome were included in these registers, and not the servile class, which made up a large part of the population. The document of Ulpianus, containing an estimate of the probable term of life from and after any given age, is introduced by Dr. Southwood Smith in his *Philosophy of Health*, p. 132. The conclusion from it, admitted by Dr. S. and others, is, that the probable duration of life in Rome among the better classes was thirty years. Were we to take corresponding classes in Great Britain at the present time, such as annuitants, we should, on the authority of Mr. Finlayson, estimate the mean duration of life among them to be above fifty years. The expectation or mean duration of life for the whole of the people of Great Britain is forty-five years, which would give them an advantage over the Roman citizens in the time of Ulpianus, or three hundred years after Christ, of fifteen

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years. In France the mean duration of life in the classes more comfortably situated, is forty-two years, or twelve more than the people of Rome in corresponding circumstances.

The shorter the mean duration of life or the mean life of a people or community, the greater the number of persons who die in a given period; that is, the greater will be the mortality. The rate then of mortality will give a measure of the means of support, and of the extent of the operation of causes influencing life. In times of barbarism, the proportion of deaths annually to the existing population is by far more than in a state of higher civilization—protection of person and property, and an improved and permanent agriculture.

To place in strong contrast the state of things in this respect, it will be sufficient to quote the difference in the rate of mortality in one city, Paris for example, in the period in which the people were just emerging from barbarism, and at the present day. We learn from a calculation made by M. Villermé, from a manuscript of the fourteenth century, that the mortality of Paris, at that period, was 1 in 16. At the present time, the average mortality, even in the very poorest arrondissement, in which poverty and destitution are extreme, is 1 in 24. So that the rate of mortality in all Paris, rich and poor, high and low, was greater by far in the fourteenth century than in the poorest and most wretched district in the same capital in the nineteenth century.

If we take two countries at the present time, Russia and Great Britain, the contrast, depending on similar causes,—semi-barbarism in much of the former, and civilization so operative in the latter,—will be equally obvious. The rate of mortality in Russia is 1 in 27; in

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Great Britain, 1 in 43.7,* nearly 44. In France it is 1 in 39.7, or almost 40; in Geneva, nearly 1 in 47, (46.92.) In the eighteenth century the rate of mortality in Geneva was 1 in 34; in the sixteenth 1 in 25; fresh proof this of the benign effects of progressive civilization on life.

In using so frequently the term civilization, I must suppose that the reader attaches meaning sufficiently clear to save the necessity of either an abstract definition or a description of its complex nature. It will be sufficient in this place, in order to illustrate the position already advanced of health being most diffused, and the mean of life greater, in proportion as both the moral and physical nature is developed and strengthened, to state the basis of civilization and its chief elements, and then to make this statement the link between preceding remarks, and those which are to follow. The basis, or at least the preliminary step and itself a means, is congregation in communities of some compactness, or in other words a population of some density. But this cannot be procured without a full and a regular supply of food, itself necessarily the product of a careful and protected agriculture. From an adequate production then of food from the soil arises the ability of men to form permanently established communities, and thence to engage in the exercise of their various faculties, and to exchange with one another, at first, the coarser productions of art, and afterwards, the higher and more complicated results of intellect and sentiment. These are the elements that, according to the extent with which they are worked out, constitute civilization; and just in the same proportion to this result, are health and length of life more generally assured. In fact, both

* According to Mr. Edmunds.

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civilization and health originate from the same primary and chief cause, abundance of food, and both are expanded and strengthened by the subsequent complex relations of men to each other, growing out of their ability to procure without much difficulty abundant aliment.

It becomes, therefore, an object of interesting inquiry, to point out the geographical distribution of food, and especially vegetable substances or those that are produced from the soil, as on them mankind mainly depend for their support. In doing this, I shall indicate the masses of people which derive their subsistence, for the most part, from particular articles of vegetable food, glancing at the same time at the impediments to their procuring it in adequate quantity, by a perverse use of it to other purposes. This last will lead to a notice of the transformation of food into other states, for drink, in which its nutritive property is either greatly diminished or entirely lost, and of the effects direct and indirect on the national health, if the transformed matter is taken instead of substantial aliment by a people or by large masses of them.

The alimentary habits of a people are the first which merit inquiry where we would study either supports of health or the causes of disease among them. Population is mainly dependent on those habits: health and longevity hardly less so. Next to the study of food is that of the air and its varying states, and the greater or less extent of protection against its vicissitudes and exemption from its impurity. These are subjects which involve a consideration of climate, locality, habitation, fuel, and clothing;—and which are alike connected with health and with civilization. Climate would at first seem to be beyond man's control, but we soon see that its primary influences may be, as they are, greatly modified by the other circumstances of locality, and in

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a remarkable degree by the kind of habitation, for residence and protection from atmospherical vicissitudes, and the accompanying aids of clothing and fuel. Progressive knowledge in all these points put into practice constitutes progressive civilization, and presumes an increased activity of the intellectual faculties. This activity, thus operative and applied, becomes, also, necessarily a cause of promoting health concurrently with civilization, as the means are common to both. Need it be added, that the intellectual activity developed by the better sentiments under moral and religious culture, makes the wealthier and more intelligent counsellers and guardians to those less favourably circumstanced, and thus becomes the proper accompaniment of civilization, and indeed necessary for its completion. The direction of these sentiments, it may be not unmixed with some selfish considerations, to the improvement of waste and marshy land, the ventilation of streets, and improved methods of rural and domestic economy, of course contributes powerfully at the same time to promote the general health. Happily, indeed, whilst all the affections, personal as well as social, contribute to health, their manifestation is not left to the capricious volition of the person or party on whom more immediately devolves the duty. The wrong of omission is visited upon both parties. If, for example, a mother refuse to yield to the promptings of maternal instinct, and fail to nurse her child, the latter is not the only sufferer in health;—she herself becomes liable to infirmities, if she is not immediately afflicted with them. The owner of a fine mansion surrounded with gardens and park, and possessed of all that can embellish material life, must, even from considerations of a purely selfish nature, attend to the state of his poorer neighbours and

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dependents, if they reside in low and marshy grounds, liable to be overflowed by the very stream, the falls of which constitute one of the ornaments of his domain. Even were he not impelled by benevolence or pecuniary interests, a regard to his own health and that of his immediate family would induce him to recommend and aid these people to drain and cultivate lands, which, if left uncultivated, would deteriorate the air, and be productive of disease, both harassing and dangerous. So, also, the rich inhabitants of elegant houses and wide and well paved streets have a positive and direct interest in the state and condition of their poorer fellow-citizens in contiguous courts and alleys. Accumulations of filth and offals in these latter, and destitution from want of food, fuel, and clothing of their tenants, may readily generate a mortal and malignant disease, the attacks of which, though pressing most heavily on the poor, are not harmless to their richer neighbours. In proportion as civilization advances and the relations of men to each other become multiplied and complex, a more methodical and continued attention is paid to all suitable measures, calculated to prevent the injurious operation on the public health of personal or local impurity and taint. Whilst the poor are aided, and the unfortunate encouraged to renewed trials, the thriftless and the vicious are restrained from practices which would injure the health of others. The combination of benevolence and intelligence in this way, manifests itself in a public manner in the enactment and enforcement of sanitary laws, which, although they are at times inefficient and founded on error, are, in the main, evidences of civilization, that look to a still farther amelioration of existing ills.

In the preceding remarks, no pretension is made to

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novelty of view, to those who have made the subject either of political economy or of the philosophy of health and longevity their study. But aware of my own feelings of surprise, when I first heard of the wonderful effects of civilization on health, and of my vague notions of the nature of the connection between the two, I have thought that it would not be amiss to analyze the question, for the benefit of many of my readers, who might otherwise look on civilization as a mere abstract idea, or as a mystical expression of the social combinations of men, and of all their follies, vices, and mad contradictions, as well as of their virtues, and intelligence. Looking at civilization in its elements and combinations, we are bound to reject the vicious and the absurd as foreign to it, or at least, as fungous growths and excrescences from, but not an integral part of it. This is the high moral and religious test by which civilization should be tried. The physical or the hygienic test, that of man's health and longevity, is precisely to the same purport:—and unless morals and religion and public and individual health are all made progressive, and afford each other reciprocal support, civilization is retrograding, its impulses are erroneous, and its elements wrongly combined. Do we require an example on a large scale, by which we can at once assure ourselves of the accuracy of the principle now laid down, we need but mention war. In war between nations, the people are thrown back towards barbarism, by the ascendancy of the impulses of destructive courage over the better sentiments; and if the intellect manifests activity, it is chiefly under these impulses. The entire state of things is antagonist to civilization and to religion: it is eminently so to health and life. Great as is the loss of life in the field of battle, greater still is it in the series of

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measures and movements undertaken to procure a battle. The long and exhausting march, encampment in sickly situations, the exposed bivouac, imperfect supply, and often deficiency of food, alternating with intemperance of all kinds, and the wildest excesses,—these are causes of ruined health, and of loss of life far more numerous, and collectively more powerful than artillery, and the sword and all the destructive missiles and machinery of battle. But this is not all—Industry suffers at home by the withdrawal of labourers from the field for the army, and it suffers abroad by the devastations committed,—crops destroyed, granaries rifled by these same men in hostile march through an enemy's country—Famine and disease are thus often left to tell that armies have traversed a country, and fought in it. Nor does the injury to health cease even with the return of peace. Habits unfitting men of war for productive industry, have been acquired, and idleness, and licentiousness are continued, until health is irretrievably lost. If the curse of war be long entailed on a nation, the physical energies of its people may suffer by the loss of its finest population, to such a degree that the succeeding generation will fall short even of the former standard stature, as was the case with the French youth drafted for the army after the general peace. In 1826, out of 1,033,422 young men drafted to serve in the army, 380,213 were sent back, because they fell short of even the diminutive stature of four feet ten inches French.

We cannot, after these premises, which might be extended and illustrated to fill a volume, err in the conclusion, that the practical moralist is, both for himself and the community, a sound hygienist.

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CHAPTER II.

NATIONAL DIETETIC USAGES.

Influence of abundant food—Progress of mankind in providing suitable aliment—Pastoral life—Agriculture—Superiority of countries which are the best cultivated—Abundance a protection against pestilence—Services rendered by the Romans to European horticulture—When was the flesh of animals first used—Comparison between the feeders on flesh and fish, and those on vegetables—Influence of climate—Majority of mankind subsist on vegetable substances alone—Dietetic regimen of the ancient Greeks—Athenians and Spartans—Of the ancient Romans.

The influence of abundant food, in augmenting population, and preserving health, and of a deficient supply in shortening life, and bringing on widespreading diseases, is now generally admitted. Wherever there's a loaf added there's a man born, was a metaphorical expression of a political economist, which can hardly be called exaggeration; at any rate it represents an important truth. The connection between health and food is well set forth by a late writer, (M. Melier), by his representing in two curved lines, the variations of general mortality and the price of bread: these curvatures will be found to correspond in their rise and fall with all the fluctuations in these particulars. The influence of the dearness of food is observed, however, more distinctly in the year next following, than in that in which it has occurred. The constant increase in the

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population of France is explained, by the progress of agriculture, the modifications which the laws relating to grain have undergone, and especially by the introduction of potatoes. To the extended growth of this last vegetable must be attributed the great increase in the population of Ireland; and to the abundance of aliment of all kinds is due, in good part, the rapid and great additions to the population of the United States.

History records the progressive stages, in which mankind, or at least certain portions of them, have passed, before the earth was cultivated in such a manner as to yield an abundant and regular supply of vegetables for food, and at the same time to support animals, to be appropriated for the same purpose. Men, we are told, in the first stages of society, when it was yet in its simplest form, and ere communities were organized, lived on the fruits, and herbs and roots, which were spontaneously produced,—as if they were acting in conformity with the Divine command to Adam, "And thou shalt eat of the herb of the field." From what we know of the alimentary habits of the South Sea islanders, and the people of some other portions of tropical regions, we can readily understand with what facility a population not over-numerous could subsist on such fruits as the plantain, the bread tree, the cocoa and the date, and roots like the cassada and the yam, without their being addicted to agriculture, or scarcely using any tillage. These people, living in a warm climate, would care little for animal food; and it would be easy to make the prohibition to use it an article of religion, as in the case of the Hindoos. But, it is also equally demonstrable, that in more northern latitudes, in which the earth was less lavish of nutritive vegetables of spontaneous growth, men would be prompted to make

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up the deficiency of vegetable, by the addition of animal food.

Under the mixed feelings of hunger and a desire to be freed from the alarming proximity, if not direct attacks of wild beasts, the first inhabitants of the woods and wilds would be compelled to engage in the chase. It may have been, that the spectacle exhibited, in a stronger pursuing and destroying a weaker animal and eating its flesh, first suggested to man the eating of animal food. Be this as it may, it is certain, that animal food was and is the chief nutrimental support of the wandering savage; and its use is less evincive of incipient civilization, than that of vegetable food, the product of man's culture of the earth. But the gratification of hunger could not be regularly met by the pursuit of game, which is so uncertain in its amount, and changes its habitation from year to year; nor could the chase of it be continued systematically by men from whom the discharge of the duties of social life was expected. It was necessary, therefore, to domesticate those animals, the flesh of which experience taught to be most nutritive and palatable; and happily for this purpose, those most prized, such as the ox, the sheep and pig, were, by their gregarious nature, easily reduced to control and superintendence. So, likewise, it is worthy of remark, the chief vegetables for nutriment are cultivated gregariously in a manner, such as wheat, rye, barley, Indian corn, potatoes, &c., which supply a much greater amount of nutriment than the solitary ones, such as the palms, &c.

To this stage, or the pastoral, succeeded the agricultural, in which husbandry was followed, and a methodical supply of more nourishing products of the soil was procured. These consisted of the leguminous tribe

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and the *cerealia* or grains, which were soon raised in such abundance as to allow of a part, not required for present subsistence, being stored away for the coming winter, and until another harvest had gladdened the hopes of the husbandman. From this, the next step was easily made—that of exchanging the superfluity of one district or country for articles from another less fertile or productive.

The transition from the hunting to the pastoral and agricultural stage, is not made with any uniformity among different people, and by some not at all. The ancient Germans, though regarded in the light of barbarians by the Romans, a character which in some respects they undoubtedly deserved, were already possessors of herds of cattle, and raised grain. Our North American Indians, who, by some of the commentators of Tacitus, have been compared to the Germans, have never, except as half-breeds or under the guidance of half-breeds, become either pastoral or agricultural. Whether conquerors or conquered, they would seem to be incapable of attaining to high civilization, because, averse to agriculture by which they could produce, or to trade and the arts by which they could procure the productions of other people, they could never have had a large and fixed population, nor a basis for advances towards intellectual culture. The Germans, if they had been conquered by the Romans would, like the Gauls, have received the arts of the victors, as an engrafting on their agricultural and pastoral life, just as, when they themselves were the conquerors, they were not long in adapting themselves, although at first imperfectly, to their new function of masters of the fallen empire.

Contemporaneous with the first addiction to agricul-

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ture by a hitherto savage people, would be the domestication of certain animals, and the use of their milk for nourishment, and of their wool and hair for clothing. Some nomade tribes, such as the Tartars and Arabs, have never gone beyond the pastoral stage, or at the most, have been content with procuring for themselves by culture, often by barter or pillage, a small quantity of grain for bread. Their use of animal food is irregular, and more as hospitable treat than for daily repetition.

I just now adverted to the almost entire neglect of agriculture by the Indians of North America. But the remark is not applicable to the aborigines of Mexico, who, even anterior to the conquest by Cortez, formed, especially at and around the capital, a dense population, which could not have been supported without systematic culture of the soil. It is probable, however, that even then agriculture was in a crude state among the Mexicans, as it is at this day among their descendants; and that famine, an occasional infliction at the present time, was not unfelt in those days. The inhabitants of Mexico, as Humboldt informs us, have increased in a greater ratio than the means of subsistence; and accordingly, whenever the crops fall short of the demand, or are damaged by drought or other local causes, famine ensues. The American Indians, says this writer, naturally indolent, contented with the smallest quantity of food on which life can be supported, and living in a fine climate, merely cultivate as much maize, potatoes, or wheat as is necessary for their own maintenance, or at most, for the additional consumption of the adjacent towns and mines. The too nice balance between food and population, is more evident in warm climates than in less genial ones; in which latter, a more substantial

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aliment is required, and greater pains and industry must be used to procure habitation and clothing to guard against the inclemency of cold.

No longer compelled to be wanderers living on acorns, or, as some allege, chestnuts, like the first Arcadians, according to Greek tradition, nor to search the woods in quest of wild peas for food, like the early Argives, drawing another example from the same quarter, men, once become stationary, were inspired with ingenuity to give at first comfort, and afterward adornment to their permanent residence. Heretofore, the temporary hut or shed in the woods, or cave by the hill-side would have been readily abandoned for other imperfect shelters or districts in which wild fruits, or roots and herbs were more abundant. The superiority of those countries, the inhabitants of which were most successful in agriculture, soon became obvious; as in the instance of Chaldea and Egypt, and in later times, Sicily, the two last of which contained a teeming population, remarkable for early civilization, and extraordinary progress and refinement in the arts. In no regions at this day is population so redundant, as in those where vegetable substances, the product of the soil, constitute the chief, we might say, almost the exclusive food of the people. The reader is immediately reminded, by this remark, of India and China, and in Europe, of the valley of the Po at Lombardy, and Ireland, the latter, an instance nearer home, and of more immediate concernment to all, on both sides of the Atlantic, who speak the English language.

With these facts of such moment and magnitude before us, we cannot wonder that the pagan Greeks and Romans paid divine honours to Ceres, the reputed author of an approach towards a more rich and whole-

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some diet, and of the means of procuring a store for all seasons of the year, by her teaching to till the ground and sow grain. Little cause shall we have, in the present state of our knowledge, to join in the poetical rhapsodies in favour of the primitive and golden age of the poets, which was that of acorn eating, or when, as Hesiod sang,

> The fields as yet untilled, their fruits afford,
> And fill a sumptuous and unenvied board;

or admire the people described by Ovid—

> Content with food which nature freely bred,
> On wildings and on strawberries they fed;
> Cornels and bramble-berries gave the rest,
> And falling acorns furnished out a feast.

But in thus speculating on the probable course and order of change of habits among mankind, by which they advanced from the savage and nomade, to the agricultural and civilized state, we must be supposed to refer to those people who were out of the circle, or at a distance from the centre of early civilization. It is quite clear, it seems to me, that in the plains of Chaldæa, Noah and his family cultivated the soil after, as they had been accustomed to do before, the Deluge; and that the practice of agriculture thus resumed, was, ere long, extended westward towards the Mediterranean, southward into Egypt, and eastward into India and China. From these first families and nations of agriculturists, branched off the Scythian, the Celtic and the German people into Europe, and the Mongul and Tartar nomades into Northern Asia.

In the historical periods of the world, we find uni-

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formly, that, in the train of successful agriculture, comes a numerous and healthy population; and, in the same country, just in proportion as the soil is suitably cultivated, will be the general prosperity of the people, and their immunity from devastating disease; so, on the other hand, with its neglect come poverty, and decay, and pestilence. It was thus with the Roman empire, in its several stages of infancy, maturity, and decline. Never was pestilence so rife, nor mankind, since the flood, so nearly threatened with extinction, as when agriculture was neglected, and the requisite supply of vegetable food cut off in consequence, as in the reign of Gallienus, and subsequently in that of Justinian. The infant republic of Rome was frequently affected with famines, caused by wars and faulty and deficient agriculture. In her more triumphant days, and under the more flourishing periods of the empire, the accidental scarcity in any single province was immediately relieved by the plenty of its more fortunate neighbours.

Whilst censuring the tyranny and wars of conquest of Rome, we ought not to forget, that the agriculture of modern Europe is a continuation, improved and enlarged it is true, of that introduced by the Romans among the conquered people of Spain, Gaul, and Britain. "Under the protection of an established government, the productions of happier climates, and the industry of more civilized nations were gradually introduced into the western countries of Europe; and the natives were encouraged, by an open and profitable commerce, to multiply the former, as well as to improve the latter." Gibbon, whose language I have used on this occasion, states also the obligations which we are under to the Romans for the large and important ad-

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ditions to horticulture. "Almost all the flowers, the herbs, and the fruits, that grow in our European gardens," continues this writer, "are of foreign extraction, which in many cases is betrayed even in their names." The apricot, the peach, the pomegranate, and the orange, together with the olive, are cited here by the historian; also flax and the artificial grasses, particularly Lucerne, which derived its name and origin from Media.

Agriculture cannot be said to be successful in procuring the greatest amount of nutritive productions from the soil, with the least waste of health and life of the people, unless domestic animals be largely used to increase mechanical power. In this respect, its state in the civilized countries of the world gives encouragement to the philanthropist. In France, M. Dupin estimates the effective agricultural power to be five times greater by the aid of animals, than if man alone were employed. In Great Britain, the gain in this way is twelve times more than the mere human bodily force which is enlisted.

The question of the time when mankind first began to eat the flesh of animals, has been agitated with considerable keenness, but more, we believe, as a part of biblical criticism than of dietetics. According to one set of commentators, the first permission by the Deity, for man to eat animal food, was that given to Noah in the words of Scripture: "Every moving thing that liveth shall be meat for you; even as the green herb have I given you all things." Gen. ix. 3. It has been contended, on the other hand, that the dominion given to Adam over the brute creation, (Gen. ii. 19,) implies a permission to kill animals for food; and that the skins of which God made coats for our first parents, shows that

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a proper use was taken of such permission. In support of the other side of the argument, it has been alleged, that the wild and inordinate indulgence in their appetites and passions, by the Antediluvians, was kept up by flesh meats and strong liquors; and that in this way, they were incited to the commission of those crimes which provoked the Deity to their destruction. Corroborative analogies have been adduced, in the fact of carnivorous animals being the most ferocious and untameable; and of the greater propensity to hunt and kill animals, and eat of their flesh, manifested by savage than civilized man. But, in both these instances, it seems to have been forgotten, that the propensity is anterior to the means of procuring its gratification; although the former is no doubt strengthened and made fiercer by indulgence. Be this as it may, one thing however is certain, that the icthyophagi and people who eat much flesh meat, and in greater proportion than vegetable food, are less civilized, in every sense of the word, than those who derive either the greater part or all of their aliment from the vegetable kingdom. A broader contrast can hardly be furnished, in this respect, than between the Esquimaux and the Laplander—the first, eaters of seal and walrus, and the second, of reindeer—and the Hindoos and Chinese, so many millions of whom live exclusively on rice. To the same purport, and perhaps more to the point, is the difference between the agricultural and phytivorous South American and Mexican Indians, and the nomade and hunting and carnivorous North American Indians, eaters of buffalo and deer. The admirer of brute force and courage may give a preference to the latter; but the present social position of the former, and the part which they are destined, have in fact already

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begun, to play in the great drama of political change and regeneration in South America and Mexico, designate them to a more elevated position in the scale of humanity, than their more intractable but more savage fellow aborigines of the North. In making these comparisons, I do not wish it to be supposed that there are not other causes operative besides the nature of the food; but merely assert, that for physical growth and strength, and endurance of fatigue, vegetable diet is proved, in many situations, to be amply sufficient. Still, I am not prepared to say, with Rosseau, "that great eaters of meat are in general more cruel and more ferocious than other men," although this opinion has been repeated by Byron, who alleged that he felt an increase of savageness in himself, when he ate meat for any length of time. This eccentric genius had, however, a great deal of innate savageness in his composition, which required small exciting cause for its manifestation. But our subject at present, is the practice of entire people, not the opinions or the idiosyncrasies of individuals.

Climate is regarded as the chief modifier of the appetite for particular kinds of food among the different people of the earth. But the nature of the soil, and its greater or less degree of cultivation are, I think, more influential causes. In warm climates, that is for thirty to thirty-five degrees on each side of the equator, vegetable food in some shape or other is the kind chiefly used. As we advance beyond these limits, particularly in the northern hemisphere, the proportion of animal food increases until we reach the hyperborean regions, the inhabitants of which live almost entirely on fish and rein-deer. With the exception of the people just named, and the inhabitants of the sea coast of northern Europe

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and of western Africa, and some islands, which produce fish in abundance, a very great majority of mankind subsist almost entirely on vegetable substances, and chiefly the cerealia or farinaceous grains, and the kindred legumes, and roots, such as the potato and cassada. On this point there is an agreement in practice between the husbandmen of Tuscany, a majority of whom only allow themselves meat once a week, and the people of the Highlands of Scotland and of Ireland, the larger number of whom have not even this addition to their somewhat scanty allowance of oatmeal and potatoes. If the peasantry of Italy consume little animal food, those of Spain and Portugal consume less. The wandering Arab does not habitually use meat; it is with him rather a feast than a regular meal.

I repeat, that by far the greater number of the inhabitants of the earth, have used, in all ages, and continue to use at this time, vegetable aliment alone: when the addition of meat to vegetables, for food, is made, it is not a daily allowance; and even in these cases, the proportion of meat to vegetables is small. This remark is applicable to the people of antiquity, as well as to those of modern times.

The Athenians subsisted mainly on vegetable food, and the same may be said of the ancient Greeks generally. When laws were promulgated, forbidding an ox, or a lamb a year old to be killed, as was at one time the case in Athens, we must infer that the use of animal food was exceedingly restricted. A qualifying remark is, however, in place here. Swine were eaten the first of all animals, being wholly unserviceable for other purposes; and even after other flesh came to be eaten, it was thought unlawful to kill oxen, because they are very serviceable to mankind, and partners of their labours

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in cultivating the ground. Farther exception might be taken to the opinion of the ancient Greeks using an aliment chiefly vegetable, from the fact of Homer so often specifying the kinds of meat served up at the repasts of his heroes, as when Agamemnon, at an entertainment which he gave to Ajax, presented this latter with the chine of an ox, as a reward for his valour; and Alcinous in a banquet fed his guest upon beef. But the very emphatic mention of these things shows their rarity; and that they were introduced only on days of festival or rejoicing, and by those high in power and rank. It has been observed, as illustrative of the daily fare of those whom the heads of the house were not particularly desirous of pleasing,—that the suitors of Penelope, though given to all sorts of pleasure, are never entertained with either fish or fowl, or any delicacies. The principal food of the heroic age was barley, and porridge made of barley meal, sometimes mixed with oil, not unlike the *polenta* of the modern Italians. Barley was the first grain cultivated in Attica; hence the sacred law, according to which barley was strewed over the sacrificial ox, and thin cakes of barley formed part of the offering. Afterwards, in more civilized ages, barley bread came to be the food of beasts, and of the poor who were not able to furnish their tables with better provisions—a change precisely the same as that which has taken place in the farinaceous food of modern nations. Wheat bread, with olives, figs, and other fruit, and less seldom, with cheese and eggs, constituted the diet of the Athenians in their most flourishing days: the common people used garlic and onions as condiment. Honey was, also, largely eaten, either alone with bread, or incorporated in the flour, in the form of cakes. Of animal food, fish, fresh and salted, seem to have been

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the kind most used; next to this came poultry and game, but these articles could not be partaken of by the mass of the people. Even in a formal banquet, at Athens, the number and variety of fruits, vegetables, &c. exceeded those of animal substances. There were commonly on the occasion of a feast, three courses; the first provoked the appetite rather than satisfied it, by sharp herbs, eggs, oysters, asparagus, olives, and a mixture of honey and wine. Poultry and fish were the chief materials of the second course. The third consisted of sweet meats, with Thracian, Lesbian and Chian wines. On the score of fish, the wealthy Athenians were great epicures. But it would be as great an error to infer the habitual fare of the majority of the Athenians, from repasts like these, as to draw conclusions from a banker's dinner or an alderman's feast, respecting the dietetic regimen of the people of France or of England. For this reason, I shall omit details of epicurism, manifested in the search after and selection of alimentary substances, and their odd compounding for the table, among the dinner-givers of Athens, as my design is merely to give a sketch of national regimen.

The simplicity of living in Sparta is known to every reader. Their public tables were not, however, provided by the state, but contributed to by each adult male citizen. The articles thus contributed, besides money, were meal, cheese, figs and wine. Meat, occasionally at least, formed a part of these meals, since, independently of other proof, a citizen was excused for absenting himself from them if he had been engaged in sacrifice or the chase, with the understanding that he should send a share of the victim or of the game to his companions.

The national diet of the Romans in the early ages of the republic was necessarily simple, and mainly of vege-

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table aliment of the commonest kind, viz:—pulse and barley,—a variety of the former of which (*frictum cicer,*) long, if not always, constituted a part of the usual food of the lower orders. The latter after a while was replaced by wheat; and barley was only used in cases of necessity, from the failure of the wheat crops, or as a punishment to the soldiers who had misbehaved. Thus, we learn, that in the second Punic war, the cohorts which lost their standards had an allowance of barley assigned to them by Marcellus. Augustus Cæsar commonly punished the cohorts which gave ground to the enemy, by a decimation, and allowing them no provision but barley. The two primary objects to which the attention and energies of the state were for a long time directed, were the support of armies and encouragement of agriculture. The successful legions were rewarded with a portion of the lands of their enemies, on condition that they should cultivate them during peace, and be ready to defend them in case of war.

The division of the people of the republic must have been early made between the *Plebs urbana* and the *Plebs rustica;* and the practice begun which was so long, and so injuriously to the state, continued, of a donation of grain to the necessitous citizens of the first, or the city populace, whom we can hardly regard in a different light from that of the *lazzaroni* of Naples at the present day. The ancient, like the modern idlers and vagrants, must have been content with a limited supply of food, and that almost exclusively vegetable. At first, it is probable, that the distribution of grain from the public granaries to the people was for a very small pecuniary price; and only at a later period that it was a donation at the expense of the public treasury, and sometimes of individuals who were desirous of ac-

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quiring by this means popularity and influence with the people. The burden of accusation against Spurius Mælius was, his having courted popular favour by gratuitous distribution of grain, in order to get possession of the supreme power.

The frequent agitating discussions and dissensions, bordering on civil war, arose out of, or were connected with, the division of land and adequate supply of grain among the Roman people; and the republic was more than once almost convulsed with the question of what, using modern phraseology, may be called its corn laws, as Great Britain is about to be now from the same cause. The sale of grain was given in charge to certain state commissioners who had a regularly elected president at their head; and on this body, aided by others, likewise devolved the task of providing for the alimentary wants, as far as the supply of grain was concerned, of the city of Rome. At first these wants were met by the products of the country around, including probably Etruria to the north and the country of the Samnites to the south. At this period of the republic the patrician shared with his clients and his slaves the toils of agriculture; the farms were generally small, and the produce of the land abundant. But as soon as the principle, maintained by Appius Claudius, the prince of the senate, by Marcus Scævola the great jurist, and by Crassus the *Pontifex Maximus*, that the attainment by Rome of universal empire depended on the race of free Italian husbandmen, was slighted, and pasturage and vine growing took the place of tillage, the republic received a vital injury. The sources of supply of grain became more remote; and Sicily and Africa now assumed, or rather were compelled to perform, the part to which Italy alone had been previously competent, especially before the

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destruction of the Etruscan and Samnite leagues. With the extension of the estates of the patricians, and substitution of pasture for tillage, in order to meet the increasing demand for a larger and more varied supply of animal food, the small farmers and farm labourers were thrown out of employment and went to the city, to swell the already increased number of the rabble, whose chief reliance for subsistence was on the donations of wheat from the public granaries. In the time of Augustus, these lazzaroni thus claiming on the strength of their free and transferable tickets, amounted to 200,000 persons. We are not well apprised of the quantity distributed to each person;—some writers saying that it was five bushels, others five pecks, monthly. That this class of citizens was regarded with more contempt than pity, we may infer from such passages as the following, in which Juvenal, speaking of a certain person, thus predicts his downward course:—

> "A vile corn-ticket be his fate at last."—*Sat. VII.*

And also Persius in terms not more respectful—

> "Each Publius, with his tally, may obtain
> A casual dole of coarse and damaged grain."
> *Gifford, Sat. V.*

These gratuitous distributions of bread-stuff by the state should be regarded as a kind of Roman poor-rates. Let it be repeated, however, to the honour of Augustus, in the flowing language of Gibbon, that his "anxiety to provide the metropolis with sufficient plenty of corn was not extended beyond that necessary article of subsistence; and when the popular clamour accused the dearness and scarcity of wine, a proclamation was issued

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by the grave reformer, to remind his subjects that no man could reasonably complain of thirst, since the aqueducts of Agrippa had introduced into the city so many copious streams of pure and salubrious water."

As the empire and greatness of Rome declined, the demands of her idle and thriftless citizens increased, and they now required an allowance of food which the soldiers of a Cincinnatus and a Camillus would have regarded as even a Patrician luxury. "The monthly distribution of grain was converted into a daily allowance of bread; a great number of ovens were constructed and maintained at the public expense, and at the appointed hour, each citizen who was furnished with a ticket, ascended a flight of steps which had been assigned to his peculiar quarter or division, and received either as a gift, or at a very low price, a loaf of bread of the weight of three pounds for the use of his family." During five months of the year, a regular allowance of bacon was distributed to the poorer citizens, and the annual consumption of the capital was ascertained by an edict of Valentinian the Third, at three millions, six hundred and twenty-eight thousand pounds sterling. As if these means were not enough to encourage pauperism and to degrade the people, an additional step was taken to increase the evil by issuing wine on unusually easy and liberal terms. "The administration of the public cellars was delegated to a magistrate of honourable rank, and a considerable part of the vintage of Campania was reserved for the fortunate inhabitants of Rome." The reader will probably, without waiting for the suggestion, after reading this last passage, have made the reflection that the citizen soldiers of republican Rome living on the simplest vegetable food, and on water, or water mixed with vinegar for their drink, overcame all their

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enemies; whereas, the degenerate slaves of the empire, supplied with animal food and intoxicated with wine, were beaten by every invader, and their city plundered alike by Goth and Vandal. The times were changed from those when, as Pliny tells us, the Roman citizens ploughed their fields with the same diligence that they pitched their camps, and sowed their grain with the same care that they formed their armies for battle. Corn (grain) he says, was then both abundant and cheap. This was the state of things for the first five or six centuries after the foundation of the city. Subsequently, foreign conquests, by enlarging the dominions of the republic, increased also the remote estates of the successful generals and patricians, and made them negligent of their lands near home. The attractions of luxury, and of festivals and shows, multiplied in the city with the influx of wealth from Asiatic conquest, and the dietetic and other usages of the East, and kept the wealthy away from their estates. Varro, who wrote in the century before the Christian era, or in the seventh from the foundation of Rome, complains, that in his time the great men resided too much within the walls of the city, and employed themselves more in the theatre and the circus than in their cornfields and vineyards.

A century earlier than the age of Varro, although Italian agriculture had already declined, yet, as we may infer from the details of rural life and of practical farming given by Cato the Censor, and farther enforced by his own example, the rural population had a more abundant and varied food than their fellow-citizens at Rome. Cato is very precise in his directions how to treat the slaves, who were labourers, on a farm, and particularly the kind and amount of food which they ought

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to receive. The chief articles which he specifies, are bread and wine,—of the former of which each slave ought to be allowed, he thinks, a quantity equal to three or four pounds avoirdupois daily, according to the season and the kind of labour performed; and after the vintage, a daily ration of wine, weak it is true, like *piquette*, drunk by the labourers in the vineyards of France at the present day, but amounting in the year to more than seventy-four gallons. A portion of fish and vinegar, and of olives and figs, was also allowed to the farm servants and slaves.

But whilst agriculture languished at home, and the means of alimentary support were consequently less, the original Roman system was extended with advantage to the remoter provinces; and Gaul, and Spain, and Britain exchanged their forests and their savage inhabitants for cultivated fields, rich pastures, and a greatly increased and well-fed population. Britain was said even to be able to export bread-corn during a part of the period of Roman domination; and Spain, if we can take literally the praises of Calumella, exhibited then, in some portions at least of that country, a better husbandry than at the present day.

It does not come within the scope of my present design, to speak of the entertainments of the wealthy Roman citizens, and of some of the emperors, whose cruelty kept pace with their extravagant epicurism. It has been well said of these repasts, that prodigality of expense seems to have been more studied than delicacy of taste, and sumptuous waste more than elegant arrangement. The details which have come down to us serve, however, to show the alimentary substances, some of which the Romans habitually used, whilst others were prized highly as a delicacy.

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The chief meal was their *cæna*, which we translate, supper. Changed as modern habits are, in respect to the hour of dining, this term would now be unhesitatingly rendered by the English one, dinner. The *cæna* (the hour for which was four o'clock in the afternoon) was the principal meal of the Romans, at least of the affluent citizens: as to the mass of labourers, in town and country, and farmers, it is not probable that their repasts were taken at a different hour from that at the present time. The mid-day meal, *prandium*, or dinner, was the only substantial one of the plain citizen, whereas it was with the luxurious, as it is now with the same class in Europe, a luncheon. The Roman repast consisted of two courses and a dessert. The first, (*mensa prima*,) was of eggs, stained of various colours, shell-fish, vegetables, and such trifles as compose the side dishes or *entremets* of our modern tables; the second, (*mensa secunda*,) comprised ragouts, roast meat, and fish,—the latter was particularly prized by the luxurious Romans, as it had been by the Athenians of former times. The dessert, (*bellaria*,) contained the usual proportion of fruit and confectionary; but it was customary to serve it on a separate table, and even the more substantial parts of the supper were, occasionally, brought in on portable tables, or placed before the guests on frames or trays. The fruits consisted of apples, pears, nuts, figs, olives, grapes, almonds, raisins, dried figs, dates, pistachio nuts, &c.

The same kinds of flesh and poultry, except the turkey, were used for food by the Romans, which are in demand at the present time among the people of Europe and of the United States. Pork stood higher on the list of animal aliments than dietetical writers are

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inclined to place it in modern times. We have seen, that it was issued to the poorer citizens of Rome, together with bread; and we are told, that it was most esteemed by the athletæ both of Greece and Rome, as imparting to them more strength than other meats. To these practices we might very well compare the large use of pork by the rural population in different parts of Europe and America, and, by that numerous class, the sailors, of all the maritime countries of the world. Beef was considered in ancient, as it is in modern times, to be a most substantial nutriment. But the Romans allowed themselves a much wider range in animal gastronomy than comports with our taste at the present day. They were not only fond of young bears, dogs and foxes, but, also, held in esteem the flesh of camels, and particularly the heels of these animals, as well as asses' flesh: the wild ass, brought from Africa, was thought to be equal to venison. They were as much amateurs of canine flesh as the Chinese are now—fricaseed sucking puppies were in great request. The wild boar was looked upon as their most sumptuous dish; but then it was served up stuffed with game and poultry. Juvenal's asperity was softened by the idea of this animal, in connection with the pleasures of the table, as he calls it—

"——— A beast
Designed by nature for a social feast."

And Horace is still more diffuse in his praise of a "Lucanian boar of tender kind," and of the accompanying incitements to a jaded appetite—

"Rapes, lettuce, radishes, anchovy brine,
With skerrets, and the lees of Coan wine."
B. II. Sat. 8.

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Water-rats, snails, and maggots fattened on old timber, were among their greatest dainties. Fulvius Hirpinus has acquired a name and a fame for the discovery of the art of fattening snails on bran and other articles. Like some modern patentees, the specification is not that of the method by which success is procured. Horace informs us, that these snails were served up, broiled upon silver gridirons, to give a relish to wine. One is puzzled at whose taste most to wonder,—the snail eater or the wine drinker in such conjunction. Grasshoppers, locusts, and various other insects, had also their admirers among these polished barbarians; for, compared with the Greeks, the Romans must always be so regarded.

Poultry, as I have already remarked, was largely consumed by the conquerors of the world, whose taste in the varieties of the feathered tribe was as diversified as the climate and productions of the empire itself. Many a modern gastronome will join with them in admiring the goose, of which incredible numbers were annually consumed; as also, the livers of these animals, which were then, as they are now in France and parts of Germany, esteemed great delicacies. Even the colour of the bird, from which the liver was procured, was not a matter of indifference; white being that preferred. Modern taste falls short of the Roman, in the ancient partiality for peacocks, ostriches, flamingoes, swans, cranes, and rare singing birds, as dishes for the table. That of Heliogabalus was regularly served with ragouts of the livers and brains of small birds, the heads of parrots and pheasants, and the tongues of peacocks and nightingales.

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CHAPTER III.

NATIONAL DIETETIC USAGES (*continued*).

Depopulation and deficient supply of food in Europe in the middle ages—Diet of the people of the East—Egypt—Nubia and Abyssinia—The *brinde* of the Abyssinians—Persia—The Arabs—their temperate regimen—Hindostan, universal use of rice in—The Chinese—their general use of vegetable regimen—The Japanese—The people of the East India Archipelago—their simple food—Addiction to narcotic stimulants—People of Northern Asia—The Tartars and Siberians—their use of animal food, particularly horse flesh—their *koumiss*—Limited supply of food among the Siberians—their excessive use of tobacco—Europe, its advantages over Asia—Norway and Sweden—food used in—Intemperance among the people—Denmark, the like state of things in—Holland—food and distilleries—Germany, large consumption of swine in—German breweries and distilleries—Russia—Poland.

WITH the downfall of the Roman empire followed great changes in national regimen, as well at the capital as in the provinces. The revolution in agriculture and industry in general, is thus briefly told by a celebrated writer and political economist:—"When the German and Scythian nations overcame the western provinces of the Roman empire, the confusions which followed so great a revolution lasted for several centuries. The rapine and violence which the barbarians exercised against the ancient inhabitants interrupted the commerce between the towns and the country. The towns were deserted, and the country was left uncultivated;

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and the western provinces of Europe, which had enjoyed a considerable degree of opulence under the Roman empire, sank into the lowest state of poverty and barbarism."* These calamities lasted five centuries, during which, the finest regions of Europe were uncultivated, the alimentary products, of course, few and badly prepared, and the population correspondingly small and ill fed. He who records the return of society to a better state of things, by an improved agriculture, in the middle ages, cannot overlook the obligations of mankind to the monks. They were the restorers of learning, by which the mind was nourished, and of agriculture, by which the body was fed; and in this point of view, we cannot deny them the merit of being among the chief agents of civilization in modern times. "We owe," says Mr. Hallam,† "the restoration of a great part of Europe to the monks. They chose, for the sake of retirement, secluded spots, which they cultivated with the labour of their hands." Mr. Turner (*Hist. of Anglo-Saxons*) also bears similar testimony, when speaking of Anglo-Saxon husbandry:—"Domesday-book gives us some indication that the cultivation of the church lands was much superior to that of any other order of society." Horticulture was, in like manner, carried by them farther than by other classes. The breaking up of the monasteries, and the confiscation of their lands, had a powerful and abiding effect in the amount and value of nutrimental products of the soil in England, and in the dietetic regimen of a large number of the small farmers, and of the labourers and poor.

Too much space would be required, even if I pos-

* Adam Smith, Wealth of Nations, Book III, Chap. II.
† History of the Middle Ages, Part II, Chap. IX.

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sessed all the materials, for giving a full account of the alimentary regimen of the different people spread over the earth at the present time. The end will be attained with sufficient exactness, and in a more instructive manner, by my giving a few sketches of this nature first, and then describing the several substances, particularly vegetable ones, and their geographical range and proportionate value, in reference to the amount of the nutriment they severally contain, and the numbers who are fed in them. In both divisions of this part of my subject, I shall introduce statistical returns of the amount of grain and other vegetable productions, and of live stock, which supply food to the people of the respective countries in which they are found.

Beginning with the people of the East, as the most ancient, and whose regimen has undergone little change from the time of Abraham and the Pharaohs to the present day, we shall find, that their main and almost exclusive food is vegetable, and the kind of this in most general use is rice. This was the first grain cultivated and used in Egypt, and even now outranks in importance any other. The poorer people can seldom afford to eat meat, but subsist chiefly on rice, made into a pilau, and moistened with rancid butter or oil. In Upper Egypt, where they cannot procure rice, they make a hasty meal on boiled horse-beans, or of lentils steeped in oil. Onions are used to an incredible extent. Dates supply them with sustenance part of the year; and in summer, the vast quantities of gourds and melons which are then produced, place within their reach an agreeable variety. Their drink is the water of the Nile, more or less purified, with the occasional addition or alternation of buffalo milk.

In Nubia and Abyssinia, millet or *dhourra* (*sorghum*

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vulgare), and another variety of grain, the *teff*, constitute the chief aliment. But, as if to contradict the proposition, that vegetable is the food preferred by the inhabitants of warm climates, and animal those of cold ones, we find the people of Abyssinia evince a marked penchant, not only for flesh meat, but for raw flesh cut out of an animal alive, and while the fibres are yet quivering. When Bruce first related this, as a fact which had come under his own observation, during his residence in Abyssinia, he was vilified, jeered and ridiculed as not only a liar, but the most impudent of liars. But Pearce and Coffin, who remained in the country, and became intimately acquainted with the manners of the people, afterwards fully confirmed, in the most literal acceptation of his words, the whole narrative of Bruce on this disputed point. The favourite portion is called the *shulada*, and is cut out, on each side, from the buttocks, near the tail. As soon as these are taken away, the wounds are sewed up by these surgical butchers, and plastered over with cow dung. The animal, which had been thrown down before, and during the operation, is now allowed to rise, and is driven forward on its journey. The fashionable parties at Gondar, the capital of Abyssinia, are served with *brinde*, or raw meat, with the same hospitable feeling as, in our part of the world, they would be with venison chops, done just to the turn. The animal, a cow or a bullock, is brought to the door, and the dainty pieces cut off in the manner above described. But, on this occasion, the animal is killed, before doing which, all the flesh is cut off in solid square pieces, without bones or much effusion of blood. Two or three servants are then employed, who, as fast as they can procure the *brinde*, lay it upon cakes of teff

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placed like dishes down the table, without cloth or any thing else beneath them.

The days of fast of these carnivorous and licentious people, misnamed Christians, amount to no less than a hundred and sixty-five in the year. The fast is only preserved, however, until about three o'clock in the afternoon, after which, they make up for their former reserve. The doum-tree furnishes a fruit to the Abyssinians, which takes the place of the date-palm. Its flavour is compared to that of gingerbread.

In Persia, rice is represented to be in universal use as aliment; but Mr. Fraser tells us, that the cultivators of the soil, or the peasants, are seldom found without a supply of good wheaten cakes, some mas or sour milk and cheese. Fruits, such as dates, grapes, pomegranates and melons, and nearly every variety prized in Europe, viz., peaches, apricots, cherries, and currants, are abundant, and serve both to diversify their food and to quench thirst. But the Persians are not content with these; they use wine freely, notwithstanding the prohibition of the Koran.

The immense number of flocks and herds, which constitute the sole wealth of the wandering part of the population, or the Kurds and Turkomans, render the products of the dairy abundant in Persia. "The culinary vegetables, as turnips, carrots, cabbages, lettuces, cauliflowers, peas and beans, radishes, celery, onions, garlic, parsley, egg fruit, cucumbers, and others, yield not in excellence to those of Europe." Methodical cultivation and security of property would place all these at the disposal of a majority of the Persian people.

The Arabs, both in Arabia Proper and in Persia, Syria, Egypt and Barbary, and the adjoining regions to

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the south, have all nearly the same habits and fashions of alimentary regimen. Those nomade, yet pastoral tribes, the Bedouins, have for their sole wealth, except that procured by plunder, their flocks and herds, the milk and butter from which, and a scanty supply of grain converted into flour, constitute their chief nourishment. If another substance were to be specified as coming next to bread in its importance to them, it would be dates. In Egypt and parts of Persia and Barbary, their bread-grain is rice; in Nubia and Syria, and other elevated districts, millet, and occasionally wheat and pulse. The daily and universal dish of the Aenezees (the chief tribe of Arabs) is the *ayish*, which is flour and sour camel's milk made into a paste and boiled. The *bourgoul* is wheat boiled with some leaven and then dried in the sun, and in this state it is preserved for the whole year. Bread is used at breakfast, which they bake in round cakes, either upon gridirons or upon heated stones, over which the dough is spread and immediately covered with glowing ashes; sometimes the fire is put into glazed earthen pots, and the paste spread over the outside. Camel's flesh is rarely eaten; it is more esteemed in winter than in summer, and that of the female is preferred. A kid or lamb is prepared out of compliment to a distinguished guest; a person of less note is treated with coffee, or bread and melted butter. Sometimes an entire sheep is roasted, in a hole dug in the sand, and lined with heated stones. Upon these the flesh is laid, and then covered up closely with cinders and the wet skin of the animal. In an hour and a half the meat is cooked, and as it loses none of its juices, it has an excellent flavour. Travellers agree in praising the meat dressed after this primitive fashion. The Arabs use butter to excess; it being an ingredient in every dish,

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and they frequently swallow a whole cupfull before breakfast. The operation of churning is performed in a goat-skin bag, which is tied to the tent-pole or the branch of a tree, and moved constantly backwards and forwards until coagulation takes place. The Arabs of the villages use more than their brethren of the desert, various fruits and vegetables; and to a certain extent they may be supposed to modify the nature of their food by the fashions of the people among whom they sojourn.

Except camel's milk during a repast, water is the only drink of the Arabs; and even of this in their wanderings in the desert they are sometimes deprived of for days together. If we are to measure the goodness and appropriateness of a dietetic regimen by the hardy and athletic frame, and endurance of fatigue under the exposure of a burning sun, of those who follow it, we are bound to think well of the vegetable food and water drink of the Bedouin Arabs. Their sole cordial and beverage after meals or as a social accompaniment is coffee.

In India and the greater part of China, Cochin China, the Birman Empire, and the islands of Java, Sumatra, &c., rice is the staff of life, being used in these countries to a greater extent than any grain in Europe or America. It is in fact the food of the highest and the lowest —the principal harvest of every region in the East. With some vegetable oil, and occasionally herbs and fruits of the season, rice constitutes the food of the people of Eastern and of Southern Asia, in the countries above mentioned. A pound and half of rice daily is the allowance of food on which an adult Hindoo will not only live but work, his drink the while being water. No one who has the slightest pretension to caste will

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admit beef within his lips. The palanquin bearers or *coolies*, four of whom carry a traveller and his baggage and the carriage itself, in all weighing from three to four, and sometimes five hundred pounds, are fed in this way. These men are relieved by four others after a distance of two miles. In this way they will perform a journey, with the above burden on their shoulders, from twelve to fifteen miles, at the rate of three to four miles an hour; the place of these eight being then taken by a relay of the same number. Is this diet an evidence of poverty? Rice and water suffice for the food of the purest castes or high classes; and it is only among outcast classes that intemperance is found to prevail. The Mohamedans, though by no means so scrupulous, are yet temperate. Their chief luxury is fruit.

The Chinese are very reserved in the use of animal food. Rice is the common bread-grain of the country, and the sole nutriment of millions in it. *Petsai*, a species of cabbage, is the universal culinary vegetable, and swine the most abundant live-stock. The animals chiefly used as food, when an addition is made to their vegetable fare, are pigs and ducks. The latter are bred in immense numbers, and educated to a degree that would be no discredit to certain featherless bipeds, from whom more might be expected. The ducks are split open, salted and dried in the sun, and in this state make a pleasant addition to the meal of rice. *Petsai* is called a species of white cabbage, although it does not, I believe, belong at all to the *Brassica* tribe: boiled, it has the flavour of asparagus; raw, it eats like lettuce. It often weighs from fifteen to twenty pounds.

The wide range which the Chinese allow themselves in animal food is not so much a proof of their carnivorous propensities as of the limited quantity of common

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flesh meat, and still more of food of any kind in so redundant a population as that of China. This will serve to explain their eating dogs, rats, and almost every kind of animal flesh. A favourite luxury with the rich consists of soups made with the gelatinous substances, sea slug, bird's nests, &c. imported from the islands in the China and Java seas. Tea, the common beverage of all classes, is taken without milk or sugar. It is kept ready made and drunk cold at any time of the day, and presented to guests in formal visits, or in shops to customers. This last fashion will bear comparison, advantageously enough to the Chinese, with the once, and until recently, common enough practice in our own civilized and Christian land, of a store-keeper having a bottle of whisky or rum on his counter, for the use of any person who might call to purchase, or even to look at, his goods. Along the coast and in the rivers of China, fish are caught in large numbers, and they contribute not a little to the food of the inhabitants of this part of the empire.

The Japanese, as well from religious scruples as from motives of economy, are represented to be still more abstemious than even the Hindoos, in their not only avoiding animal food, but also milk and its preparations. Hot rice cakes are the standard food, and are kept ready at all the inns to be presented to the traveller the moment he arrives, along with tea, and occasionally sacke or rice beer. But this account (*Murray's Encycl. Geog.*) is at variance with another which states, that the chief food of the people of Japan is fish and fowl, both of which they procure in extraordinary large quantities, and rice. (*Loudon's Encyc. Agriculture.*) It is probable that both statements are correct, in a qualified sense; vegetable being the prevalent regimen in the interior, and fish and poultry nearer the sea-coast and estuaries.

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We might say with truth, that the Chinese are large consumers of hog's flesh and of ducks, but the remark would still apply to only a limited number of the enormous population of China. Tobacco is the chief and common article of personal and social enjoyment among the Japanese, as opium has unhappily become of late years among the Chinese.

The people of the East Indian Archipelago, in which are included Java, Sumatra, Borneo and the Philippines, use a simple diet, consisting chiefly of rice, with the addition of fish, which they procure in large quantities. In Sumatra, maize is grown for the use of the poorer class, rice being the bread-corn of the wealthier. It has been noticed, that the people of these islands manifest a remarkable propensity to the use of stupefying stimulants. Wine, and, still more, spirits of their own manufacture, are liberally used, in defiance of Mohamedan injunction; but it is chiefly in *bang*, a substance extracted from hemp, in tobacco, and above all in opium, that the chief excesses are committed. In the intemperate habits of these islanders in the use of non-nutritive and narcotic stimulants, we find another exception to the alleged influence of climate on the dietetic regimen of a people. The inhabitants of warm climates, and above all of intertropical regions, have, it is said, no desire for those excitants which the people of the north crave, and as some pseudo-physiologists would persuade us, require, to enable them to resist the depressing effects of cold and moisture. But the exception to tropical practice affords no exception to the effects of such regimen on the people now under notice. The social state—manners, morals, and intelligence—is in that low degree among the islanders of the East Indian Archipelago that always results from habitual, which so soon becomes ex-

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treme indulgence in the use of intoxicating or narcotic stimulants.

In strong contrast with the almost exclusively vegetable diet of the Southern Asiatics, of whom we have hitherto spoken, is the large, if not exclusive, use of animal food by the inhabitants of Northern Asia—Tartary and Siberia. The Tartars, like the Arabs, lead a nomade life; and their wealth is of the same kind,—their flocks and herds; the horse being the animal for service and locomotion among the former, as the camel is chiefly among the latter. But the Tartars not being able, like the Arabs, to make an exchange of their pastoral wealth for the products of the soil among contiguous people, are compelled to rely chiefly on animal food, and this, according to our notions, not of the most savoury kind. The favourite food of the Tartars, is horse flesh: with these people, horses, like oxen elsewhere, are carefully fattened for the tables of the rich. The limited number of horses, and the higher services to which a large proportion must be put, place this *delicacy* in a great measure beyond the reach of the poor, who can only enjoy it occasionally in winter, when the scarcity of pasture obliges the camp to kill such as they are unable to subsist. In the absence of the most valued kind of flesh, the poor, and the wandering tribes in general, must put up with mutton in its stead.

To the horse, the Tartars are also indebted for their national and characteristic liquor. The milk of the mare is fermented into an intoxicating drink, called *koumiss,* which is their favourite beverage, and one which those of them who are Mohamedans do not think comes under the stern prohibition of the Koran against wine. These Tartar logicians do not, therefore,

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think it any harm to get drunk on the fermented milk of mares; whilst they carefully eschew the fermented juice of the grape. Our own moderate drinkers at home, whilst they eschew ardent spirits, that is alcohol mixed with water, think it no harm to pledge each other freely in wine, that is alcohol mixed with water, a little acid, extractive matter, and sometimes free sugar.

In Siberia proper, abundant as is the supply of grain, and adequate to the wants of the people, it is not procured by the tribes to the north, Tunguses and others, bordering on the Polar seas. The sole employment of these people is hunting and fishing, mainly for the sake of food, and in part to procure furs for clothing and trade. They live chiefly on soured cow's milk, mare's milk, and horse flesh. Bread is unknown among them. Fat is the greatest delicacy; and they eat it in every possible shape, raw and melted, fresh and spoiled. The inner bark of the larch, and sometimes of the fir, is grated and mixed with fish, a little meat, and milk, or fat in preference, and made into a soup. In September, the inhabitants near the rivers obtain a seasonable supply of fish, (herrings,) which are caught in large quantities; but owing to their not using salt with their food, in fact being positively averse to it, they do not turn this annual supply to the account which they might do for their winter and spring stock of provisions. Reindeer flesh is also eaten. Their dogs, which are their chief animals of burden, have fortunately a taste similar to that of their masters. This fact will not surprise; but the same cannot be said of the food of the dogs of the South Sea Islands, which, like that of the inhabitants themselves, is there entirely vegetable—bread fruit, yams, &c.

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The Northern Siberians are excessively fond of tobacco; and it is used both by men and women, who swallow the smoke, and bring on thereby a stupefaction, as pleasurable to them, and in the eyes of the impartial moralist as loathsome, as drunkenness brought about by wine or brandy is among more civilized people. This is, probably, what our inveterate smokers nearer home would call the *intemperate* use of tobacco. It would be a curious question to be determined by a court of inquiry, composed of members of the three learned professions,—how many pipesful or segars, how many quids, and how many pinches of snuff may be taken in the course of the day, within the line of *moderate* or *temperate* indulgence in the use of tobacco. It would, I fear, have puzzled the Doctors of the Sorbonne, if they had been consumers of tobacco. Tested by the laws of physiology and hygiene, of ethics, and of social politeness, there would be no difficulty in reaching a satisfactory conclusion.

Europe, with a greater variety of nutritive products of the soil, furnishes to its inhabitants a more abundant and varied aliment than Asia. There are in the former more of those contrasts between people entirely phytiverous and entirely carnivorous, as in the instances of the Hindoos and the Tartars; but generally, in Europe there is a certain amount of animal food consumed at the same time with vegetable food, and both are subjected to various culinary processes, by which, whilst they please the palate, they become at the same time more digestible. Exceptions are, indeed, not unfrequent to this condition of things; for, whilst in some countries the proportion of animal food is too great, at any rate amongst certain classes in it, in others there is a defi-

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ciency; and in all, the cookery is either by far too negligent or excessively and injuriously artificial.

In the few sketches which I have collected of the dietetic regimen of the inhabitants of Europe, I shall, as I did when speaking of that of those of Asia, endeavour to detail the food of the people, the masses in a country, rather than of the wealthy and luxurious.

Beginning with the people of Scandinavia, we find that the Norwegians use rye as their bread-corn, and in some districts they mix the inner bark of the larch with the meal from grain, in order to increase the quantity. In north Norway and Lapland, barley is said to be the chief produce, and in some places oats. Fish is procured in abundance, and is a common article of diet, in the maritime districts especially, which, considering its extensive line of coast and numerous bays, must include a no small portion of the kingdom. The herring fishery is both a means of supply of food and of foreign trade. Perhaps I may in a subsequent chapter give some statistical details on this head.

The annual produce of grain in Norway is stated to be 2,650,000 tons, a quantity inadequate to the wants of its inhabitants. The importation to make up the deficiency is about 750,000 tons; but I ought not to say deficiency, for of this quantity no less than 500,000 tons are consumed in the distilleries. Potatoes are also destroyed in the same way; and also much grain of home production.

The products of the dairy are abundant in Norway; and cheese, besides being freely used at home, is also exported. Coffee is much used, and a traveller (*Personal Narrative*, &c. &c.) tells us that coffee-drinking is almost as great a vice as spirit-drinking among the men. "Norwegian women of whatever rank must have

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their strong coffee at least twice a day; even although they should be obliged, in consequence, to forego the common necessaries of life, and to keep their children in rags. If coffee, spirits and tobacco, were prohibited in Norway, it would be a richer and a happier country." This traveller, just afterwards, asks, "What country will set the example in prohibiting the use of poison in the shape of cheap spirit?" He then adds very properly, "But the decrees of government, though they may altogether prohibit, have little effect in regulating prices." Drinking has always been a besetting sin with the Norwegians.

The dietetic usages of the people of Sweden are nearly the same as those of the Norwegians, even to the excessive use of distilled spirits. Every landholder is allowed to manufacture the produce of his own farm, and pays a trifling duty for a license, if he buy and manufacture as a trader. The agricultural products are proportionably more abundant in Sweden, than in the adjoining kingdom; as now she is able to export grain to meet the wants of others,—whereas, thirty years ago, she did not raise enough for her own. The total produce of the kingdom, in grain, in 1828, was 6,499,000 tons, and in potatoes, 3,248,000; the latter crop is much cultivated, and has obtained a preference over all other alimentary plants. It is reckoned that, of the entire produce of the kingdom, a third part is consumed in seed, distilleries, breweries, and the feeding of cattle. The amount of oxen, cows and calves is computed at 1,900,000. In summer they are driven to the mountains, and go there in folds by the sound of a horn or lute, as in Switzerland. The sheep are computed at 1,562,000. The proportion of animal food consumed by each inhabitant has not been calculated.

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Forsell, a writer who has taken pains to reach the truth in the statistics of Sweden, shows, that one half of the Swedes are poor, and that every fifth person is unable to support himself. Of this latter class, 9240 persons were inmates of poor-houses. Besides dissipation, misfortune in business, and other casualties, there is one cause, rather peculiar, assigned for the great extent of pauperism in Sweden,—the devastations committed by beasts of prey. But worse than the ravages of wild beasts, and of war even, is the raging devil of the still, which, according to the calculation of Forsell, causes three-fourths of all the crime, want and misery that prevail in Sweden. "Of late years," this writer adds, "the conscriptions showed that in various districts, nearly one-third of the youth were unfitted for taking any share in the defence of the kingdom." From the protocol of the diet in 1787, it appears the yearly consumption of brandy in 1787, was 5,400,000 kanns, (3,736,800 English gallons,) when Finland was united to Sweden. But forty-two years later, (1829,) when that province was annexed to Russia, it amounted to at least 22,000,000 kanns, or about 15,000,000 gallons.* Drunkenness seems to be the epidemic vice of the Scandinavian people. Brandy is resorted to on all occasions; it qualifies the breakfast, acts as a whet to the appetite before dinner, and is not more indispensable at marriages and merry-makings than on Sundays after sermon.

In the peninsular part of Denmark proper, (Jutland,) the chief aliment furnished by the soil is rye, buckwheat, and potatoes; fish enters into the food of a large part of the inhabitants. The wheat is barely sufficient

* Scandinavia, Ancient and Modern, &c. No. 137 Family Library, by Andrew Crichton, LL. D., and Henry Wheaton, LL. D.

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for the consumption of the few persons who can afford to eat bread made of that grain. The proportion is not more than two pecks for each person. Norway requires 100,000 quarters, or 800,000 bushels of rye, besides much barley and malt for distillation. In the islands, Zealand, &c., barley is the principal grain, out of which, and also buckwheat and oats, the bread of the people is made. In Sleswick and Holstein, parts of Denmark, the chief grain is oats. These duchies, and also the islands, have extensive pasturages, and furnish largely the products of the dairy, both for home use and exportation. Some idea may be formed of the extent of trade in these articles when it is added, that there were exported from all Denmark, 4,671,260 lbs. of butter, and 596,100 of cheese in the first six months of 1825. In 1826, the quantity was less; or, 105,464 cwt. butter, and 9,406 cwt. cheese. "The renowned Hamburg beef" is furnished by the animals pastured in the meadows of the western coast of Sleswick.

Not dissimilar from the diet of the Danes, is that of the people of the duchies of Mecklenburg Schwerin and Strelitz, including their addiction to distilled spirits. A family of eighteen persons, on a farm, consume food, during the year, as follows: wheat, two-thirds of a bushel each person; rye, ten bushels each; barley for the house-keeping, in malt, grits, pearl-barley, &c. for each person, on an average of eight bushels, being one hundred and forty-four bushels; pease for the family, six bushels: meat, viz., one ox, four cows,—two larger and two smaller, ten sheep; and also, an allowance of herrings.*

* William Jacob. Tracts relating to the Cow Trade, p. 211–12.

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Holland being chiefly a country of pastures, must derive her grain from abroad; the meat furnished by the cattle goes to the towns. The products of the dairy are great, and serve, with a limited quantity of meal and potatoes, for the food of a considerable proportion of the rural population. In the northern and eastern provinces, (Overyssel and Groningen,) the great mass of the people subsist almost entirely on potatoes. Even in the heart of Holland, between Rotterdam and Utrecht, Mr. Jacob informs us, that the agricultural labourers are chiefly subsisted on potatoes, and a kind of gruel (*brey*) made of oats or rye, and seldom more than a portion of salted meat once a week. How many persons, with full round Dutch forms, plump, and more than roseate cheeks, this class furnishes, we have no means of knowing. Ardent spirits are largely consumed by the Dutch, although they are not called a nation of drunkards. Their excessively humid climate enables them to tolerate excesses of this kind, better than their southern neighbours; but it is no affectation of philanthropy to believe, that the amount of grain appropriated to distillation would receive a much more beneficial direction, if it went to increase the quantity of their too scanty food.

The poor labourers and families could not be expected to obtain the grain from the same class of importers, nor perhaps through precisely the same channel of foreign exportation; but even if they were not direct consumers at all, so as to enhance importation, better health and habits of industry, by abstinence from spirituous drinks, in addition to the saving of money now paid for these liquors, would enable them to give more time and labour, and, if in cities, more mechanical skill, in exchange for an ad-

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ditional supply of food to that which they now receive. Their purchases, either directly or indirectly, would also authorize, in a commercial and economical view, the outlay of the capital, now invested in distilleries, in agriculture.

The general return from inquiries respecting the food of a small farmer or a successful artizan in Holland, is bread, principally rye, cheese, potatoes and other vegetables, beans and pork, buttermilk, with buckwheat.

Belgium, producing more grain than Holland, and at the same time having extensive pasturages and abundant live stock, may be supposed to furnish a better aliment to her rural population. Rye is grown, both as the corn-bread and for the distilleries: it is in the proportion of two to one of wheat. Thus, if 7 represent the quantity of land sowed with rye, 3½ will indicate the proportion of wheat, 3 of oats, 2.8 of barley, 1.3 of potatoes, 2 of buckwheat, 1.1 of pulse. A favourite dish with the Flemish farmer, is buttermilk boiled, with rye flour mixed in it. Pork and salt fish is the animal food most easily procured; and this, or milk and cheese, with rye-bread and potatoes, and some other vegetables, and weak beer, constitute the common food of the farmers and their farm servants:—occasionally, though not for daily use, they add fresh fish and fresh meat. They mix with their edibles, a plentiful supply of butter, or rendered lard in its place. Kidney beans, stirred and stewed in milk, is a favourite dish. The day-labourers are not so well provided; they have, however, rye-bread, potatoes, buttermilk, and occasionally some salt fish.

Germany, consisting of different kingdoms and states, with great differences of climate and soil, will not exhibit uniformity in the food of her inhabitants. Rye is

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the chief bread of Northern Germany; wheaten is only found, to any extent, in the Southern states, as Austria and Bavaria. Maize is grown in Moravia. The great German family, of somewhere about 30,000,000, is decidedly a pork-eating one; the vegetable addition is prepared cabbage, or *sauer-krauet.* Add to these, bacon, sausage, raw herring and beer, or a sour wine, and we shall have a good idea of the staples of German food. But the poorer classes cannot procure themselves a daily pittance of meat even of any description. If they can procure it once or twice a week, living in the interim on potatoes and bread, other vegetables, and pudding and milk and their *wasser* soup, the relishing ingredient of which is butter, they must be content.

It has been calculated, that there are no less than 8,000,000 of hogs slaughtered annually in Germany; and although some of this amount is exported, in the shape of hams and sausages, yet there is an importation from Hungary and Turkey. Hassel estimates the number of the oxen, cows, and calves of Germany at from twelve to fourteen millions,—of which Prussia, on this side of the Elbe, has 1,328,000, and Austria 2,600,000. There are supposed to be 20,000,000 of sheep in Germany.

A brewery and distillery are the necessary accompaniments of every large farming establishment in Germany. The mere announcement of this fact indicates pretty strongly the dietetic habits of the people on the score of drinks.

Russia, with an abundant harvest of rye and oats to the north, and of the finest wheat in the southern provinces, gives, as yet, poor aliment to her peasantry. The rapid increase of the number of her people, shows the connection between food and population, although

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the former is not distributed nor made as available as it might be, were the means of communication between different parts of the empire more numerous and easy. Rye is the corn-bread of the country; it is used, also, for being distilled into liquor; then come wheat and barley; rice and maize are cultivated in some parts of Taurida. The subsistence of a small farmer or labourer on a piece of land is rye-bread, buckwheat, and sour cabbage soup, well seasoned with salt, and, occasionally, a little lard. In the province of Archangel, the industrious may procure for themselves fish, rye-bread, gruel, and occasionally meat and turnips.* The common Russian beverage is quass, or *kvas*, made by pouring warm water on rye or barley meal. The peasantry around Archangel drink also a great deal of tea. One would wish that the enumeration of drinks might end here; but the propensity of the Russians to indulge in the use of ardent spirits, and the great consumption of these liquors in the empire, are, unhappily, facts too well known.

With the more substantial and wealthier inhabitants, the preliminary use of salt fish, cheese and brandy, as a whet, is as general in Russia as in Scandinavia.

In Poland, also, rye is the bread-corn of the people; although wheat, in large quantities, is exported from Dantzig. An important article in forest culture, as it is called, is honey, which is collected in large quantities from trees, and converted into mead.

* For the particulars of the food of the poorer classes on the Continent of Europe, I am indebted to "Appendix to the Report on the Poor Laws,"—Foreign Communications.

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CHAPTER IV.

NATIONAL DIETETIC USAGES (*continued*).

France—poor diet of the majority of the people in—Intemperance in France—Amount of her alimentary vegetable products—of animals used for food.—Switzerland—Geneva—Food of the Swiss workmen in cities, and labourers in the country.—Italy—Diet of the people of Piedmont,—Savoy,—Tuscany.—Chestnut bread largely used by the Italians.—Spain,—subsistence of the people in—Their temperance.—Portuguese.—Recapitulation.—European Turkey—Greece,—The Morea—Great Britain—Food used by the people of England,—by those of Scotland, and of Ireland—Intemperance in all.—United States—Abundant Alimentary products of—Slave population,—their food.—Animal food,—chief varieties used by the people.—Comparison between the United States, and France and Great Britain—Chief kind of grain—wheat and maize for bread—potatoes—rye—barley—buckwheat—oats—rice—The products of the dairy—Excessive alimentation of the working people,—Great eaters and fast eaters—Smoking and chewing tobacco—Use of intoxicating drinks.—Diet of the people of Mexico,—of Venezuela,—of La Plata,—of Brazil—Spirituous liquors used largely by the Indian population in those countries.

France, *la belle France,* with her fertile soil, fine climate, extensive agriculture, active commerce, and vine-clad hills to boot, supplies but scanty aliment to millions of her children. There are, according to M. Dupin, twenty millions of the French people (out of thirty-three millions) who are wholly deprived of the nourishment of animal food, and live on cereal grain,

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and potatoes; seven and a half millions eat little or no bread; and barley, rye flummery, made of buckwheat, chestnuts, pulse, a moderate quantity of potatoes and water, are the only subsistence of that part of the population which has no fuel but stubble and furze.* In a large portion of Burgundy, of Champaigne, and of Franche-Comté, the farmers, like the labourers, are coarse peasants, eating black (rye) bread throughout the year, and without energy to overcome the unfortunate circumstances in which they are placed.

At and around Havre, the labouring man and artizan can procure for food, bread, a few vegetables, and cider for drink—never animal food, or very rarely. Coffee and molasses are used.

In Brittany, the artisan may procure bread and a small quantity of meat, (perhaps five pounds a week,) vegetables and fish, which are very cheap. For the agriculturists, the principal articles of food are buckwheat, made into porridge and cakes, barley-bread, potatoes, cabbages, and about six pounds of salt pork weekly; also, a little grease for the cabbage-soup, which is poured on barley-bread.

It will surprise many of my readers, who cannot connect ideas of intemperance in the use of strong drinks with the habits of Frenchmen of any class, to be told, on very competent authority, (M. Perrier, of Brest—Preface of Foreign Appendix to Report from Commissioners on the Poor Laws, p. 68,) in reference to the people of Brittany: "The principal cause of misery is inebriety: its frequency among the lower

* Mr. H. C. Carey—Principles of Political Economy; Part second, p. 216–17. Quoting Villeneuve.

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orders keeps them in poverty. The '*cabaret*' (wine and brandy shop) absorbs a great portion of their earnings. This vice is not confined to men; the women partake of it. It has decreased within the last five or six years; but is still (1834) considerable."

Of the like melancholy purport, is the communication of Mr. Newman, British Consul at Nantes, to the Poor Law Commission. In reply to a question respecting the frugality of the labouring people, he says: "Frugality in Nantes, with the labouring classes, is the effect of necessity more than of virtue. Drunkenness is common, and temperance almost a stranger to them. In the conntry, it is nearly as bad; nine out of ten of the little farmers who come to this market, Wednesdays and Saturdays, and particularly at the fairs, return home in a state of intoxication. The life led by them when on military duty, certainly demoralizes them." As regards the domestic affections and ties, Mr. Newman says: "In general, the wife and children either support themselves, or are supported by charity, whilst the husband spends all his earnings in debauchery." In reply to the question, is piece-work general? Mr. Newman informs the Commission, that "contractors generally hire the workmen by the piece; but the finances of the latter are not improved by it; for if they work extra hours in five days, they will spend the sixth in a debauch."

I shall refer again to this darker feature of French dietetic regimen in connection with health, when I speak of grapes and their fermented juice or wine, and also in a subsequent chapter upon drinks. It will then be shown, by statistical documents of French preparation, that the people of France in their use of wine, cider, beer and brandy, for drink, consume in this way,

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per individual, more than the people of Great Britain and Ireland, per individual. The evils growing out of this immense indulgence in alcoholic drinks, in the impoverishment, diseases, and demoralization of the French people, will also be exhibited, by reference to the communications and reports of their own physicians, statists, and philanthropists.

In the Gironde, of which Bourdeaux is the capital, the food varies in different districts. Throughout the district called *Landes*, occupying above one-third of this department, the food consists of rye bread, soup made of millet, cakes made of Indian corn, now and then some salt provisions and vegetables, rarely if ever butcher's meat; their drink water, which for the most part is stagnant. The food of the proprietor or working farmer in the department of the Lower Pyrennees, of which Bayonne is the chief town, chiefly consists of vegetable soups, potatoes, salt fish, pork, bacon, &c. &c., seldom or ever butcher's meat, and invariably Indian corn bread, home baked. In the department of the Mouths of the Rhone, Marseilles the chief city, the food of the labourers and poorer population is generally composed of vegetables, bread, and farinaceous substances made into soup or *bouillie*, probably once a week.

The average amount of alimentary vegetable produce of the soil in France in 1830, according to an estimate in a memoir read before the Society of Statistics was as follows:—60,553,000 hectolitres, or about 170,000,000 of Winchester bushels of wheat; and 114,733,000 hectolitres, or about 322,500,000 bushels of other grains; 46,238,000 of hectolitres, or about 130,000,000 bushels of potatoes and chestnuts. Chaptal values the chestnuts at $2,000,000. Baron Dupin (*Force Productives et Commerciales de la France*, Part II, p. 260,) supposes that

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there were 6,684,952 head of horned cattle in France in 1825. The number of swine was estimated by Balbi to be, in 1826, 4,000,000.

In Switzerland the people generally have a better aliment than their neighbours. Cows and sheep constitute the chief wealth of the Swiss farmers, and their principal means of support; goats for the poor; and cows supply the cheese from which the richer derive their little wealth. The canton of Geneva, with a population of 56,000 inhabitants, consumes per individual, in a year, about six bushels of wheat, or its equivalent in some other grain. Potatoes are, also, eaten largely. The proportion of animal food per individual is 6.45 oz. daily in the city of Geneva, or just double that of an inhabitant of Paris. The proportional consumption of wine is double that consumed in Paris.

All the weavers of Switzerland, says Mr. Bowring, from whose Report on the Commerce and Manufactures of Switzerland I have derived the preceding details respecting Geneva, make use of coffee, milk, oatmeal, and potatoes, which compose their principal food. A few indulge themselves with meat and half a pint of cider on Sundays. They are also farmers on a small scale. The workmen of Neufchatel make three meals a day, two of which (in the morning and evening) consist of coffee, milk, potatoes, &c.; at dinner, meat and vegetables, and, for those who can afford it, wine. In Thurgovia, the food consists of oat-cakes, barley, and sometimes wheaten bread and potatoes. Among the manufacturing classes the use of coffee is being introduced, and also that of animal food. The peasantry eat meat once or twice a week. The ordinary beverage of the people is wine or cider, but beer is also brewed in the canton.

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Of the Swiss peasantry in general, it may be said, that potatoes and barley, with cheese and milk, and a little maize for porridge, form the principal part of their food.

I have not seen any detailed returns respecting the food of the inhabitants of Italy; but their chief subsistence may be considered as of bread of maize or of wheat, or rice, or chestnuts, according to the region. Maize is the chief bread-corn in Lombardy and the lands watered by the Po, where rice also, in considerable quantity, is raised: wheat is found in Tuscany, the upper part of the Roman states, and parts of the kingdom of Naples and in Sicily. Maize is grown in the low grounds of these countries, in the *Maremme* or marshy region on the western coast, and near Naples rice also. Chestnuts is the chief aliment of the inhabitants of the Appenine regions; the flour is rich and sweet, and keeps well.

In Piedmont, a labouring man or artisan and his family live on the simplest and coarsest food; no meat, little wine, and twice as much maize flour as wheat flour; and after bad harvests, and consequently dear provisions, he must apply to the charity of his neighbours, or of the inhabitants of his parish.

In Savoy, potatoes, rye bread, chestnuts, and milk form the principal food of the poor. Except in the mountains the labourer eats very little meat, and rarely drinks wine. The walnut has been called the olive of Savoy, supplying as it does sufficient oil for the consumption of the inhabitants, and also of Geneva.

In Tuscany, the small farmers of the plains, who are, like most of the farmers in Italy, renters on shares, (*metayers*) pursue a rigid economy, never tasting butcher's meat but on Sunday. The three repasts of the other days are either porridge of maize (mush) or a

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salad; porridge of bread and French beans seasoned with olive oil; or of some sort of soup.

Of late years potatoes have been grown to a considerable extent, and now form an important article of food in many districts of Italy. With all classes a favourite aliment is flour made into long cylindrical rolls, or *maccaroni*, and a small variety vermicelli—olive oil is largely used, and in the summer months forms, with bread and the vegetables of the season, the food of a large number.

The subsistence of the people of Spain is chiefly derived from wheat and other cereal grains and vegetable substances, to which oil is freely added. They do not, however, grow enough of grain for their own consumption. Salted and dried fish is consumed by them in considerable quantity, and garlic is a favourite condiment. Fruits, in so diversified a climate, are abundant, and they, with water, serve to quench the thirst and gratify the palate of the generally temperate Spaniards. The Spanish labourers, in order to procure cool water in the fervid heats of summer, adopt a simple device. They expose large unglazed earthen bottles (alcarraza) in the open air, which, by causing an evaporation of the moisture that penetrates through the vessel and bedews its outer surface, keeps the contained water of a grateful coolness.

The food of the labouring Portuguese is salt fish, vegetable soup, with oil or lard, and bread made of Indian corn.

A very brief recapitulation of the preceding statements will show that the mass of the population of northern and central continental Europe, or that of Scandinavia, Russia, Germany, Holland, Belgium and France, subsist, in great part, on vegetable food, and

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this of the second or inferior of the cereal grains, viz:—rye, seasoned with the products of the dairy, and a small portion of meat or fish. I say seasoned, for, the occasional use only of animal food makes it the exception rather than the rule in dietetic regimen. Among the people of southern Europe there is equal simplicity of aliment; but maize, to a certain extent, takes the place of rye, and wheat is in proportion more freely used than it is to the north.

If I add to the preceding sketch a notice of the diet of the inhabitants of the Morea, and also those of European Turkey, there will be found the same general features as already described in relation to the rest of Europe. The labouring class in the Morea, (peninsular part of Greece,) by living temperately as these persons almost all do, can use both maize and wheaten bread, olives, pulse, vegetables, salt fish, and occasionally meat on great festivals. Their usual drink is water, but the men take wine also, moderately. The food of a similar family in European Turkey would make their food principally consist of bread, rice, greens, dried beans and pease, olives and onions, and meat about once a week.

Of the three countries, which collectively compose the United Kingdom, viz. England, Scotland and Ireland, the two last assimilate to continental Europe in the dietetic regimen of their inhabitants; their food being mainly vegetable, and of an inferior bread, corn (oats) and potatoes, to which is too frequently added large potations of distilled spirits. England boasts of the large proportion, comparatively to other countries, of animal food consumed by her inhabitants, and of the abundant nutriment in general procured by her people. Their bread-corn is wheat, supplied, as would appear

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by careful estimates, at the rate of a quarter, or eight bushels, for every individual in the kingdom. The proportionate quantity of flesh meat has not been ascertained: that for the people of London is said to be 107 pounds per individual, in the year. (*McCulloch's Commercial Dictionary;* Art. Cattle.) In addition to, or replacing fresh meat, there is, in adequate proportions, a good deal of salt pork and fish consumed by the people; of the latter, herrings and pilchards are most worthy of notice,—the pilchards being caught, and eaten, by the people of Cornwall and Devon. In these counties, 3000 hogsheads of this last are consumed annually; the quantity exported, chiefly to Italy (in 1832), was 31,000 hogsheads. In addition to potatoes, which are grown and eaten by the English people in large quantities, they procure by their skill and industry in horticulture, a variety of esculent vegetables, which furnish a seasonable variety to nearly all classes. As about one-half of the land in England is occupied for pasture, the products of the dairy abound, and they contribute to increase the list of alimentary substances in habitual use by the people. It is stated in the Preface to *Foreign Appendix to Report of Commissioners on the Poor Laws*, already referred to, that "of the 687 parishes which have given an answer, from which the diet of the family can be inferred, 491, or about five-sevenths, state that it could obtain meat; and of the 196 which gave answers implying that it could not get meat, 43 are comprised in Essex and Sussex, two of the most pauperised districts in the kingdom." This statement does not, however, it is to be feared, convey a correct view of the condition, as respects their alimentary habits, of a large number of the operatives and their families, in the chief manufacturing towns,—

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Manchester, Birmingham, Leeds, Sheffield, &c. who do not taste meat once a week, and are unable to obtain even an adequate supply of the simplest nutritive vegetable food, taking that furnished by the cerealia into the account. They are compelled to subsist on potatoes and the coarsest bread, sometimes on oatmeal and water. This class of the population, and its equivalent in London, are they who think to find a temporary alleviation to the gnawings of hunger, and the lassitude brought on by excessive toil in close and ill-ventilated shops and manufactories, by indulging in potations of the worst kinds of intoxicating drinks—drugged beer and spirits. "Beer and porter constitute the staple drink of the great body of the people; but malt spirit, of a cheap and very pernicious kind, is consumed in great quantities by the lower orders, especially in the metropolis, where it is rapidly accelerating their degeneracy." I forbear from enlarging on this point at present, as I propose to examine it more fully in a subsequent chapter on drinks.

The people of Scotland, hardy, thrifty and acute, clear thinkers and good fighters, have always lived on the simplest vegetable fare,—oatmeal converted into cakes and porridge, to which of late years potatoes are added, and the whole eked out at dinner with a little barley-broth; and in the morning and evening repast, with a modicum of milk or butter, although these last articles are often wanting. Of the 1,800,000 acres under cultivation for grain in Scotland, 1,260,000 are taken up with oats; barley occupies 280,000 acres, being reared chiefly for distillation; and wheat, but 140,000. An occasional addition to the vegetable food just described, is herrings, immense numbers of which are caught on the northern coasts of Scotland, and salted, both for

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home consumption and foreign export. Of 329,000 barrels caught and cured in 1832, 92,000 were retained for home use. In the same year, 63,500 cwt. of cod were cured in a dry state, and 5400 cwt. in pickle; of the former, 40,500 were consumed at home. The traveller will hear of, and have an opportunity of appreciating, with his landlord or wealthy host, the exquisite flavour of the mutton of the Grampians and Cheviots; but the people at large are strangers to this kind of nutriment. They can speak more knowingly of their national dish, *haggis*, a mixture of oatmeal, fat, liver, and onions, boiled up in a bag, which was once the stomach of the animal; also, of their hotch-potch, &c.

The Scotch have long had the unenviable reputation of being great distillers. In 1833, the quantity of liquor thus manufactured was a little under 6,000,000 gallons. Drunkenness and its concomitants, both bodily and mental, are at once the tax and rebuke for such a practice, which loses nothing of its intrinsic wrong by its magnitude, owing to the number of persons employed, and the implied sanction of the government, that derives a large income from its continuance.

Ireland exhibits a phenomenon in alimentary regimen, by the chief subsistence of her teeming population being the potato. Elsewhere, this root is an auxiliary more or less important and necessary to some of the cereal grains for completion of the amount of nutriment for the people; but in this country, the potato is the chief article of aliment. Next to it comes oats, which are reared in the proportion of ten bushels to one of any other grain. Of animal food, fish ranks first for its alimentary use in Ireland: they are caught in large numbers in her numerous bays, estuaries, and rivers, to meet the immediate exigencies of hunger when the common

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vegetable food fails, and partly as a substitute for meat in the diet of the wealthier, when religious scruples forbid their indulging in this latter at particular seasons. To a still greater extent, is the consumption of salted herrings, from England and Scotland, which serve, especially in the towns, to eke out the scanty subsistence of the people with something of a more stimulating nutriment than potatoes and oatmeal. Of the 181,654 barrels of herrings exported from Great Britain in the year ending 3d April, 1830, nearly one-half this quantity or 89,680, was sent to Ireland. It is the hard fate of the Irish people, or the great majority of them, to be tantalized with an abundance on their own fields, of live stock, which they cannot themselves convert into food, but must sell to meet other requirements. Even the fatted pig, so often the companion of the children in the poor man's cabin, is in due time taken to market and sold, to be killed and salted for exportation. Nor can the people afford to consume all the grain which they raise. In one year, 1830, the exportation of wheat from Ireland to Great Britain amounted to 563,618 quarters; and of oats and oatmeal, to 1,563,593: and in 1832, of 69,624 cows, nearly 150,000 pigs, 74,260 sheep, and 24,000 lambs. It has been estimated, that the entire amount of imports of alimentary substances, vegetable and animal, into Great Britain from Ireland, in one year has been as high as ten millions of pounds sterling.

Like their neighbours across the strait, in Scotland, the Irish have long been great distillers, and, also, great consumers withal of distilled liquors. If poverty and degradation, and yet a sensibility to their ills but without the ability to shun them, be an excuse for the wild excitement, and subsequent stupefaction caused

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by free drinking of these liquors, then might a plea of charitable construction and mitigated judgment be set forth in favour of the Irish; but if good health, and a naturally lively temperament, and cheerfulness which seldom abandons them, be bars to, or reasons rendering artificial exhilaration unnecessary, then must the Irish be judged with asperity, if not condemned, for their appeals to the bottle and encouragement of the still. It may be, ere long, that he who writes on this subject, will speak of the habits of the people of Ireland, in reference to their addiction to spirituous potations, among the things that were—bygone excesses, which have been universally and permanently checked, and their repetition prevented, by the labours of Father Mathew and his zealous coadjutors in the good cause.

The alimentary products of the United States of America are most abundant, and their consumption placed within the means of nearly all classes. Even the slave population of the south is better fed than the peasantry of any part of continental Europe, and luxuriously compared with a large proportion of the operatives in Great Britain. A full supply of animal food, usually bacon or salt pork and salt fish, with corn bread, is allowed to the slave; to which is added, either the Irish, or still more commonly farther south, the sweet potato; and, instead of corn, rice in the lower districts of Carolina and Georgia. In Virginia and the west, fresh meat is given to them not unfrequently. To most of them is allotted a piece of ground (a patch) for a garden, in which they grow sundry vegetables and fruits for their own use, and not seldom for that of their masters, by whom they are paid at a fair price. Poultry and eggs, which they also have of their own, is more generally sold by them, either to their master's family or at the

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nearest village or court-house; and with the money they purchase groceries and other minor luxuries, or articles of personal adornment. The fruit, which they raise in the largest quantities for their own consumption and for sale, is the water-melon. The house slaves partake of the fare of their superiors, with the exception of a more restricted use of wheat bread; but this cannot be called a privation among a people with whom, as in the case of those of the south and west, maize is the bread-corn, and the preferred one of the country. The allusion to this class of our population has made me anticipate a notice of their food, by placing it first in an account of the dietetic regimen of the people at large of the United States.

I believe that there is no other example of two of the chief cerealia grown over such an immense extent of country, and both of them used together or in alternation by the inhabitants for their bread-corn, as we find in the case of wheat and Indian corn, as grown and eaten in the United States. Throughout most of this extensive range the potato is also raised and eaten. This superabundance of vegetable aliment of the first order is accompanied with nearly a corresponding supply of animal food; and hence it may be truly said that the people of the United States are, in a large majority of them, overfed, if we compare the quantity of both vegetable and animal aliment which they consume with the quantity that is found adequate to the proper sustenance of large masses both in Asia and Europe. The artisan of our cities, and even the hired labourer in the country, eats meat oftener in the day than many of the farmers, owners of the land in France, and substantial renters on shares (metayers) in Italy, eat it in the week. The kind of animal food of the greatest consumption, perhaps I

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ought to say which is eaten over a greater extent of country, is the flesh of swine, salted pork in the northern and eastern, salted and smoked, or bacon, in the southern States. This is the standard article at table, sometimes the only one; but more commonly it is reinforced by either butcher's meat, or during more than half the year in the south and west by poultry. The supply of beef, mutton, and veal, in the northern and middle states, is abundant. In the south, bacon, poultry, and veal, are the chief animal substances used. Upwards of six millions of swine are owned in Ohio, Kentucky, and Tennessee. New York has upwards of two millions; Pennsylvania a million and a half; Virginia nearly two millions. In fine, there are, according to the census of 1840, upwards of twenty-three millions of swine* in the United States, the greater part of which may be considered to have been appropriated for the food of the people. The number of neat or horned cattle is upwards of fourteen millions, being more than that in Germany with her population of 30,000,000 of persons. The proportion also is much greater in this country of these animals killed for food than in Germany, where the requirements of agriculture call for a larger number of oxen, and the wants of the dairy for cows, than in the United States. In France, with a population of thirty-three millions of persons, there are short of 7,000,000 horned cattle, and about 4,000,000 swine. Of sheep, in the United States, the number may be estimated at between nineteen and

* The want of official returns from Kentucky, North Carolina, and Michigan, makes it difficult to give an accurate estimate of the entire products of any kind. This and the other statistical returns, which will be given hereafter, must therefore be regarded as approximative, when for the whole Union.

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twenty millions, but of the proportion reserved for wool especially, and that for food, we are not informed.

The number of horned cattle in Great Britain, (England, Wales and Scotland,) according to M'Culloch, (*Comm. Dict. Art. Cattle,*) is 5,100,000. The proportion annually slaughtered is, he thinks, about a *fourth* part of the entire stock, which gives 1,275,000 head for the supply of the kingdom: the population at the time was upwards of 16,000,000. The population of the United States is now upwards of 17,000,000. If we take the same proportion of horned cattle slaughtered as in Great Britain or a fourth, it will make our supply upwards of five millions and a half head. But as our cattle in general are not as fully fed nor as heavy as those of England, the number of pounds of beef and veal is not so much greater here than there, as the difference in the number of cattle would seem to indicate. Even were we to suppose them one-third less average weight, and, considering that the difference in the calves is small, this would be a large allowance, there would seem to be nearly three pounds of beef and veal consumed in the United States for one pound of these meats consumed in Great Britain. There are a large number of horned cattle imported into England from Ireland, but this amount will be greatly overbalanced by that which must go to increase the proportion consumed by the free white citizens of the Union, as the field slaves, for the most part, are not regular eaters of the meats in question. Then, as regards hog's flesh, the quantity consumed in the United States should be estimated to be much more than that consumed in Great Britain; thereby increasing still farther the disparity between the people of the two countries on the score of the quantity of flesh meat used for food. Pro-

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bably the difference is not so great in the quantities or in the proportion of mutton and lamb eaten, although on this point I have not the data to institute a comparison. Fish is largely consumed in the United States, both fresh, and, still more, salted.

The nutrimental substances derived from the vegetable kingdom are in peculiar abundance and variety. Wheat and maize are distributed over nearly the whole United States, from Maine to Arkansas, and are at the disposal of, as they to a certain extent are consumed by, all the inhabitants: but, in defining more accurately, we shall find that wheat may be called the bread-corn of the people of the northern and eastern States, from Virginia north; and maize the bread-corn of those of the southern and western States; at the same time that maize in the former, and wheat in the latter, region is freely eaten. In quantity, Indian corn exceeds, being 360 millions of bushels, whilst that of wheat is about 85 millions of bushels; but the proportion used in feeding horses and stock of the former is so large that we cannot well institute a comparison between the two, in their relative consumption by the people of the United States. If we allow eight millions of bushels of wheat including the quantity exported in the shape of flour, and deduct for seed a seventh, or 12 millions of bushels, there remains for consumption by the inhabitants 65 millions, or less than four bushels per individual yearly; but as Indian corn is in many States the chief bread-corn, and to the slave population almost entirely so, the average quantity for those whose bread-corn is wheat is much larger than the above; we might say nearly twice the amount, or eight bushels per individual. The quantity of potatoes raised in the United States in 1840, was about 103,000,000 bushels: as these constitute a part of the food given to swine, and in degree

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also to horned cattle, we have not the means of ascertaining the quantity eaten by the people; but this must be great, even if we make large deductions for the purposes just mentioned. Rye bread is eaten, but not to the exclusion of wheat or maize: it is, we must fear, chiefly appropriated to the purposes of distillation, although some is exported. The quantity of this grain grown in 1840, in the United States, was about 17,000,000 bushels. That of barley was only 4,000,000; it is consumed almost exclusively in brewing and distillation. As might be inferred from the great number of horses for agriculture, the road, and carriages for individual pleasure, the quantity of oats grown in the United States is considerable, being about 110 millions of bushels in 1840. Buckwheat, of which about 8 millions of bushels were grown in 1840, is not used in the form of bread, but of cakes, which are eaten when yet warm, with butter. Rice, of which about 76,500,000 pounds were grown in 1840, is exported in large quantity, or the amount of nearly two millions of dollars; as food, its use is restricted mainly to the lower counties of the States in which it is grown; the slaves, in those parts, receive a certain allowance of rice. The consumption of this most wholesome and quite nutritive grain is increasing of late years to the north.*

The products of the dairy are estimated at between 34 and 35 millions of dollars, of which New York contributes nearly ten millions and a half, Vermont nearly five millions, Pennsylvania upwards of two millions, Ohio one million seven hundred thousand, Virginia, New Hampshire, Maine, Connecticut and New Jersey, each, about a million and a half; Massachusetts upwards of two millions of dollars.

* The entire exports of "Vegetable Food" from the United States in 1840, have been reported to amount to $15,587,657.

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With such a superabundance, as I have already said, of aliment of all kinds, procurable by all classes above destitution, it is natural that the Americans should be great eaters; one man consuming as much animal food in a day as would support three labouring men in Europe; and, together with vegetables and bread, taking also his glass of milk and no small quantity of pie or pudding, with often fruit afterwards. A man in harvest time, in almost any of the States, eats at his three meals, more, in nutritive amount, than would constitute luxurious living for eight East Indian or Chinese palanquin bearers for a week. In addition to the quantity, the time for consumption of food by our people is surprising, the latter being, however, in its brevity, in the inverse ratio of the former. Often, also, the rapidity with which a meal is dispatched seems but a signal for entire cessation from all labour, even that of thought, for some time afterwards. Thus, it is common enough for men of active business habits to make an onslaught on a well furnished table for about five to ten minutes, during which brief period they swallow, we will not say masticate, for they seem to consider their teeth as quite unnecessary instruments, with a fearful rapidity, parts of half a dozen of dishes. This feat accomplished, for really a simple Hindoo or Chinese would suppose it must be a piece of jugglery, these thankless consumers of the gifts of Providence, in place of rushing out from the table to their several marts of trade, as their first inordinate haste would seem to indicate, will be seen to seat themselves very leisurely, and, with their feet up and head thrown back, to puff away at their segars, for the next hour, with a gravity and an appearance of want of all care, which would do credit to the most orthodox fol-

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lower of Mohamed, when enjoying his modicum of opium, and perchance dreaming the while of his being suddenly made a pasha of three tails, and having the plunder of a province at his disposal. But not to smoking only or the more noxious in itself, and more obnoxious to others, chewing of tobacco, do our people rely for helping digestion, as they call it, and for rousing their dormant sensibilities after their anaconda repast. Wines and spirituous liquors, the difference between the two being as 20 per cent. is to 50 per cent. of alcohol, are freely had recourse to; the first by the wealthier few, the latter by the many, in both town and country; and potations of various degrees of strength and frequency are indulged in. The time was, when the description of the drinking habits of the Scandinavians would have been strictly applicable to those of the American people; but happily, and to Providence be our gratitude due, if we thank him for anything, a change is coming over the land, slow, indeed, but regular and efficient, mild in its means, but powerful and deep in its effects.

Prodigally supplied as our country is with such a variety of esculent vegetables, which alone abate the thirst that animal food is calculated to excite, and with fruits of the finest flavour, of which all have it in their power to partake, there is less excuse for us than for the inhabitants of some other lands to endeavour to vary the pleasures of the palate by fermented and distilled liquors. The exciting property of the air of our climate, noticed by more than one intelligent and observing foreigner, might of itself forbid the use of these artificial stimulants, to a people especially, who are singularly excitable, and who require no physical incentive to that incessant activity in which they delight. The young and spirited horse, and even the well-broken

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courser require the rein and the bit more than the spur. We, of all people on the face of the earth, want brief space, snatches of calmness, for meditation and revision, but no goading; and yet goads and spurs are slight external excitants compared with the internal, driving and bewildering stimulants derived from alcoholic mixtures. But on this point, as connected with our national regimen, I shall speak with more fulness in the chapter on "Drinks."

The account of the food of the people of the other nations on the American continent will be brief. The food of the working people of Mexico is Indian corn, prepared either as porridge (*atale*), or in thin cakes, (*tortillas*), and beans (*frijoles*), like the white beans so much in use in France, with the addition of chile, a species of hot pepper, of which they eat enormous quantities by way of seasoning. In the towns, wheat forms a part of the food of the lower classes, and meat occasionally. Cassava (*manioc*) contributes largely to the food, indeed is the chief aliment, of a great number of the half-civilized rural population of Indians. The same may be said of the banana, which, according to Humboldt, is to the inhabitants of the torrid zone what the cereal grasses—wheat, barley and rye—are to Western Asia and Europe, and what the numerous varieties of rice are to India and China. It is calculated, that the same extent of ground in Mexico, on which the banana is raised, is capable of maintaining fifty individuals; whereas in Europe, under wheat, it would not furnish subsistence for two: and nothing strikes a traveller more than the diminutive appearance of the spots under culture round a hut which contains a numerous family. (*Humboldt's Personal Narrative*, Family Library, LIV, p. 328–9.)

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In Venezuela and New Grenada, maize cakes, with vegetables, form the chief aliment of the peon and his family. But animal food, though not, perhaps, regularly, is largely consumed by the people in various parts of these countries, drawing as they do immense supplies of cattle from the table plains, or the Llanos. Some of the great proprietors possess 14,000 head of cattle; and although the chief mercantile value of these animals is for their hide, yet those who will take the trouble, must readily find abundant food from their flesh, both in its fresh state, and when dried in the sun. There are half as many cattle slaughtered in Caraccas as in Paris, though the population is not a twentieth of that of the latter city; and hence, in Caraccas, as well as Carthagena, the food of the labouring men is, in greater part, animal. The banana grows in the same spontaneous abundance as in Mexico, and is, by the people of the interior, as highly prized as it is by their northern neighbours. But so imperfect is the supply of cereal grains, that large quantities of flour are imported into Colombia from the United States.

The Peruvians eat maize as their bread-corn and staple food, in the various forms of bread, puddings, porridge and roasted grain. They are fond of mixed dishes, such as the olla podrida and the chupe; the latter a mixture of fish, eggs, cheese, potatoes, and onions, eaten from a common dish in the middle of the table. Peru is generally supposed to be the native country of the potato, a variety of which (*Papas amarillas*) is deemed superior to any other; but it is an indifferent bearer. The vine flourishes in the neighbourhood of Pisco, and bears excellent grapes; the wine from which is, however, indifferent. Brandy, to the amount of 150,000 gallons, is said to be manufactured from the fine grapes in this district.

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The people of Chili, by a better agriculture than their neighbours, raise fine wheat, and supply even Peru and Guayaquil with it. Potatoes, also, grow in perfection. Among the fruits which are good and abundant, grapes merit special mention. But, as pasture prevails over tillage, and the cattle farms are the most numerous, animal food is abundant and easily procured. Our admired vinegar, which derives its name from Chili, is made from the juice of a grape peculiar to the country.

Brazil, with its vast extent of fertile lands and capabilities for every kind of agriculture, does not furnish any of the cerealia in adequate quantity for the food of the people. The chief reliance is on the cassava or manioc, on which and kidney-beans the Indians and negroes are chiefly fed. Maize is less used than in other warm climates of America. Rice is grown, and consumed in a limited degree in Maranham. Cattle, abundant in the southern provinces, are prized more for their hides than their flesh, although the latter is to a certain extent, dried, and sent to the northern part of Brazil for aliment.

In Guiana, the sweet potato, (*Convolvolus battatas*,) is a useful article of food, as it is in many other parts of South America.

In the Provinces of La Plata, or the Argentine Republic, of which Buenos Ayres is the capital and head, the use of meat is general among all classes, and is consumed by all, to an astonishing extent. Such is the abundance of both cattle and horses, that in this country the anomaly may occasionally be met with of a beef-eating beggar asking alms on horseback. Beef is almost the only food; the proportion of wheat bread, the kind used, being exceedingly small. In the city of

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Buenos Ayres, flour, to a large amount, is imported from the United States, for the consumption of the inhabitants. The beef is roasted, or rather twisted, on large spits stuck in the floor, in a slanting direction, so as to overhang the fire, a twist being, from time to time, given to expose all sides of the meat in succession; and slices are then cut out by the surrounding family. Persons from Europe and the United States, accustomed to a refined cookery, join in praising the superior flavour of the beef of La Plata; and as preferable to the flesh of stall-fed and pampered oxen at home. It is that of cattle which graze in the extensive plains (Pampas) where they meet with a rich and abundant pasturage, and where they are caught by the Guachos, with their lassos, whenever needed. An epicurean dish is made by roasting a piece of beef in the still adhering skin or hide, in which it is sewed up by the cook: this is removed before the meat is served up. In flavour and juiciness it can only be rivalled by the kid or lamb of the Arabs, when dressed in the manner already described.

Great quantities of the South American beef are preserved by drying in the sun, and slightly salting it. In this state of jerked beef, it is exported to a considerable amount; the best market being that of the Havana, whence it is sent into the country for food to the negroes on the plantations.

Intoxicating drink, of some kind or other, is used freely, and with its customary enfeebling and demoralising effects, by the aborigines and mixed races in Mexico and South America. The reader of Mr. Stephens's Travels in Central America, must be surprised at the frequent repetition of notices of drunkenness among the people in that region, rivaling fully what he

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is accustomed to see and hear of at home. The Indians are, however, the greatest sufferers in this way.

The maguey (Agave Americana) is extensively cultivated, as far as the Aztec language extends, in Mexico, for the express purpose of converting its juice into a spirituous liquor, (*pulque.*) The juice or honey, procured by incisions into the nascent flowers, has an agreeable acid taste, and easily ferments, on account of the sugar and mucilage which abound in it. This process, which is accelerated by adding a little old pulque, ends in three or four days; and the result is a liquor resembling cider, but with a very unpleasant smell, like that of putrid meat. A very intoxicating brandy, called mexical, which in some districts is manufactured to a great extent, is also obtained from it. In Peru, maize is converted, by fermentation, into a liquor called *chica.*

The Paraguay tea, *yerva matè*, prepared from a shrub of the family of the holly, is the common beverage for all classes in Paraguay and the Provinces of La Plata; and its use must be regarded as one of the features of the dietetic regimen of the people of these countries. Under the head of Drinks, I may, perhaps, give some details respecting its mode of preparation and the fashion of drinking it.

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CHAPTER V.

VEGETABLE FOOD.

Proximate nutritive principles of vegetables—Gluten—Vegetable albumen—Starch—Gum and mucilage—Yeast—Sugar—Oil. Farinaceous Seeds—The Cerealia. Their composition—Proportion of gluten, starch, &c. in each of them—Predominance of starch in grains, legumes and potatoes, cassava, &c.—Dietetic hints from a knowledge of these proximate principles—Variety with simplicity—Rice, its region—Supports more people than any other of the cerealia—Maize, its geographical range—Large consumption of, in America—Wheat, its native region—Importance—Quantity grown and consumed in Great Britain, France, and the United States—Rye—Its range—Most abundant in northern countries—Is the bread-corn of the people of northern Europe, Germany, and part of France—Barley—Its antiquity—Consumption of, in malt liquors—Abstraction of food by this means—Oats—a northern grain—largely used by the people of Scotland and Ireland—also of France—Is used in distillation—Buckwheat—Used in parts of Germany, America, and France.

Before I speak of the vegetable substances in detail, which constitute the food of mankind, it will be proper to point out their proximate nutritive principles. We soon discover that these are few in number, and that grains and roots, even of apparently diverse nature, as they certainly are of different flavour, consist very nearly of the same proximate elements or principles. The chief nutritive principles in vegetables are, *gluten*, *starch* or *fecula*, *sugar*, *gum* or *mucilage* and *oil*, on the quantity and different proportions of which depend their ali-

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mentary properties. Some of these principles may be exhibited in the familiar process of making starch from wheat flour. If we take a paste of moistened flour, enclosed in a piece of linen, and pour water, in a slow stream on it, whilst we press it in the hand at the same time, the fluid carries off a part of the flour, and leaves nothing behind in the bag but a tenacious gray substance, called gluten. The water, which we will suppose to have been received in a vessel below, has carried off the starch or fecula: this gradually falls to the bottom of the vessel, and there remain, in a state of solution in the water, some gum and sugar.

Gluten, as it is commonly met with, is a mixture of gluten and *vegetable albumen;* and hence this last is to be regarded as one of the proximate principles of nutritive vegetable matter. It is to the presence of gluten that wheat flour owes its property of forming a tenacious paste with water; and to it also is owing the formation of a light spongy bread; the carbonic acid or fixed air, which is disengaged during the fermentation of the dough being detained by the viscid gluten, distends the whole mass, by separating its parts from each other, and thus produces the *rising* of the dough. Gluten most abounds in wheat, and hence the superiority of the flour of this grain over all others for making bread. It is also met with, but in smaller proportions, in rye and other grains.

Vegetable albumen resembles animal albumen, represented by the white of egg, in its being readily coagulable by heat. It is found in wheat, rye, barley, peas and beans; and is an ingredient in both the bitter and sweet almond and in the emulsive seeds. During a certain period of its putrefaction, when it is subjected to a change of this nature, it has the odour of old cheese.

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It will answer for all practical purposes if we speak of gluten in grain as consisting of pure gluten and vegetable albumen. Gluten, from its resemblance in some particulars to fibrin, which is the basis of muscular flesh the most nutritive part of meat, has been called a vegeto-animal principle. Its analogy to animal matter is shown in its containing nitrogen or azote as one of its ultimate elements.

Starch, which we have seen to form a component part of wheat flour, is, also, one of the chief ingredients of most varieties of grain, of some roots, such as the potato, and of the kernels of leguminous plants, (peas, beans, &c.) In fact it makes up the bulk of these articles, and is the chief nutritive principle in all of them. Pure starch is insipid and inodorous, of a white colour, and insoluble in alcohol, ether, and cold water. Boiling water acts upon it readily, converting it into a tenacious bulky jelly. In a large quantity of hot water, it is dissolved completely, and is not deposited on cooling. Starch, modified by heat, is called *amidine.* With water and a little sulphuric acid, starch is converted into a saccharine matter; in fact, more than half of its bulk is convertible into sugar. By the process of malting, grain, as barley, owing to the large quantity of starch in its composition, is partly converted into sugar. A peculiar proximate principle, which they call *hordein*, is spoken of by some chemists as existing in barley; but there is good reason to regard it as a modification of starch.

The invalid who would shrink at the idea of taking potato starch boiled in water for a meal, will be slow to credit the fact that this is little different from the prized tapioca, arrow, sago or salep, all of which consist almost entirely of starch, on which their nutritive properties

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exclusively depend, reinforced somewhat by a minute proportion of gum in their composition.

Gum is a common proximate principle of vegetables, and is not confined to any particular part of the plant. The purest variety is gum arabic. Gum softens when put in water, and then dissolves, forming a viscid solution. Mucilage is not soluble, but forms a thick paste with water.

Yeast appears as a frothy, flocculent, somewhat viscid matter, which rises to the surface during the vinous fermentation of vegetable juices and decoctions. It is insoluble in alcohol, and in a warm, moist atmosphere gradually putrefies—a sufficient proof that azote or nitrogen is one of its elements, and of its analogy to animal matter. It is supposed to be closely allied to gluten. Submitted to a moderate heat it becomes dry and hard, and may in this state be preserved without change. The most remarkable property of yeast is that of exciting fermentation. By exposure for a few minutes to the heat of boiling water, it loses this property, but after some time again acquires it.

Sugar is an abundant vegetable product, existing in a limited degree in some of the grains, and in ripe fruits, also in the beet-root, but most abundantly in the juice of the sugar-cane and sugar-maple. Fermentation for making bread is dependent on sugar, as is likewise that for the manufacture of vinous and malt liquors. Sugar is quite nutritive. As a vegetable substance contributing to the food of man, I shall speak of it in a subsequent chapter.

Oil is a very abundant principle in some vegetables, and particularly in the nut tribe, (olive, walnut, &c.), and certain seeds, as flaxseed. It is closely related to animal oil and to butter.

The first and most important by far of the seeds

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termed farinaceous, are those procured from the cultivated grasses; they are styled *Cerealia*, corn-plants, or grain-bearing plants. That one among them, upon which any people depend chiefly for its food is called by that people *corn;* as *wheat* in England; *oats* in the northern lowlands of Scotland; *rye* in the sandy districts on the southern shores of the Baltic Sea, and *maize* throughout the United States, and in America generally.

I have already adverted to the community of proximate principles in different nutritive vegetable substances. The remark is strictly applicable to the cerealia, as will be seen by the following table of the proportions in a hundred parts of some of the chief principles, viz: gluten, starch, sugar and gum, and sometimes albumen.

	Gluten.	Starch.	Sugar.	Gum.	Albumen.
Wheat,*	7 to 14½	56 to 72	4 to 8½	2 to 6	
Rye,	5 to 9	60	3¼	11	3
Barley,	3½	67	5	4½	1
			Bitter matter and sugar.		
Oats,		59	8¼	2½	4
Rice,		84			
Maize, chiefly starch and some sugar.					

We shall better appreciate the nutritive properties of

* The proportions of the proximate principles of wheat are the mean of those given by Vauquelin, of the wheat of Odessa and of the Paris bakers. The lowest per centage of gluten was 7.30, in the soft wheat of Odessa; and the highest 14.55, of the hard wheat from the same place. The water was from 8 to 10 per cent., and the bran from 1.20 to 2.30 per cent. Einhoff made the analysis of rye and of barley: in the former of which grain there was husky matter or woody fibre, 6.38; and in the latter, fibrous matter, composed of gluten, starch, and woody fibre, 7.29 per cent. Hordein, which some chemists have spoken of as a peculiar principle in barley, is little else than a modification of starch and ligneous fibre; it is found chiefly in the bran.

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the cerealia, by extending a notice of proximate principles, so as to include the leguminous seeds and the nutritive tubers. Beans and peas consist chiefly of starch, with some sugar and oil. Potatoes are composed of a dry matter, in the proportion of 24 to 30 per cent., and the remainder water. The dry matter consists of starch, 13 to 15 per cent.; fibrous matter, 2 to 9; vegetable albumen, 1 to 2; gum, sugar and salts, 2 to 9; water, 70 to 80. Starch is, we see, the nutritive principle on which depends the alimentary properties of the potato. By this same principle, this root approximates to the cassava or tapioca plant, from which tapioca or nearly pure starch is procured; to sweet potato, with the starch of which sugar is combined; to arrow-root, to *Tous les Mois*, and to sago, all three of which consist almost entirely of starch. So close is the resemblance, that frequently potato-starch is sold for arrow-root; and it has been prepared and sold under the name of *English arrow-root* in England, as it has under that of *potato-sago* near Paris.

After this preliminary statement of the chief proximate and nutritive principles in vegetable substances used for food, the reader will be better prepared to see, that, whilst nature varies so much the geographical range of plants from which mankind procure their food, the essential differences are not near so great as would at first appear. Perhaps a knowledge of this fact may prevent young persons from unreasonable prepossessions in favour of any particular grain or root, to the exclusion of, or prejudice against, others equally as good and as nutritive, and quite as palatable. Vegetable chemistry shows, also, that a diet exclusively vegetable may, as it generally does, embrace a variety of proximate principles; and that

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simplicity of diet does not imply the use, exclusively, of any one of these principles. Health could not be maintained by such a course; on the contrary, variety is indispensably necessary, and, happily, it is procured by even the poorest and most wretched. They who restrict themselves, for example, to wheat, eat, together with the chief nutritive principle starch, a portion of gluten, which is analogous to animal flesh, and some sugar and gum, both of which are nutritious, and, combined with the preceding principles, give a very good variety. The eaters of rice cannot procure from this grain these advantages; but, almost always, they add to it another important and quite active proximate principle, which may be called the oleaginous, such as vegetable oil, or occasionally animal oil or fat. Milk represents, as will be seen hereafter, three proximate animal principles, having strongly nutritive properties; and either it or one of its important principles, butter or cheese, is consumed as food to a very great extent by pastoral people, as well as by the majority of the inhabitants of agricultural countries. Fruits, so abundant and rich in sugar and mucilage, in those regions in which vegetable is nearly the sole aliment of the people, make a pleasant and wholesome addition to their corn or leguminous food. In the date for instance, which we shall soon see is so highly prized for its nutrimental properties by so many different people, these two principles abound; and hence, the addition of a very limited supply of farinaceous matter, derived from rice or millet, will suffice for all their alimentary wants.

The physician prescribing and the invalid resorting to a vegetable diet, for the prevention or cure of disease, may well derive from the above remarks a salutary hint.

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They will see, that a palatable variety is both admissible and healthful; and that fault is often found with this kind of diet, when the blame really attaches to the exclusive use of one article, or even aliment. The saccharine will disagree with some, and be salutary to others,—or, as the chief portion, it will be hurtful,—secondary and in small quantities, useful, and so of the amylaceous or starchy, and the oleaginous, &c. Farther extension will be given to these views, when some additional nutritive proximate animal principles are introduced in the chapter on animal food.

Farinaceous seeds are divided into two classes; the first are the true grasses, or plants styled CEREALIA, corn plants or grain-growing plants. The second division of farinaceous seeds, is also yielded by plants of annual growth, styled *leguminous*, or podded, and likewise known under the general name of pulse. The chief nutritive portion in all these, is the proximate vegetable principle, starch or fecula. The chief plants of the cerealia are *wheat*, *rye*, *barley*, *oats*, *millet*, *rice* and *maize*, which spread, in various proportions, and in different zones, respectively, over nearly all parts of the inhabited globe, are evidences of culture by the hand of man, and means for his support. First in importance to the people who boast of the highest civilization, and who sway in a measure the destinies of the rest of the world, is wheat: but if we regard only the numbers to whom rice is the chief food, the latter would be entitled to the first consideration.

RICE, (*Oryza Sativa.*)—Taking zones of the earth in which the several grains most abound, we find that rice is chiefly and most successfully cultivated in the tropical and contiguous warm regions, as in central Asia and Africa, including the islands, and the greater

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part of China and Hindostan, Egypt and northern Africa. It is, also, grown in southern Europe, as in Naples, and the low grounds of Lombardy, in Italy, and in Valencia in Spain; and in Temeswar, in the Austrian empire, and in the low grounds of the Danube, to its mouth. In America, its culture extends as far north as Virginia, but it is most abundant in Georgia and South Carolina. From the earliest records, rice has formed the principal, if not the only food of the great mass of the population on the continent and islands of India, and throughout the Chinese and Japanese empires. In Persia, it is in general use. Its introduction into Carolina, dates only from the beginning of the last century, or not a hundred and fifty years ago. This grain is chiefly cultivated in low and marshy, or alluvial soils, which, under other circumstances, would have repelled habitation, and been an insuperable bar to population. So superior is this kind of soil for its production, that rice is produced from lands, either naturally or artificially irrigated, in from five to ten times the quantity greater than that from dry land having no command of water. But, on the other hand, owing to the occurrence of severe droughts, there is a more alarming diminution of rice, than in most other species of grain; and hence, a people who, like the Hindoos, depend almost entirely on it for subsistence, are placed in a very precarious situation. There can be no doubt that famines are at once more frequent and more severe in Hindoostan, than in any other part of the world. To a certain extent those means may be obviated by the culture of the hill or upland rice, which is grown on the cold mountains of Nepaul.

In 1830, the entries for home consumption of rice, in

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Great Britain, amounted to 153,652 cwt. of cleaned, and 189,249 cwt. of rough grain; but in the years 1832 and 1833, there was a considerable reduction of this amount.

The Carolina is preferred to any other variety, in the Western, as the Damietta is in the eastern hemisphere. The product of rice, in the United States, in 1840, was upwards of 76 millions of pounds, of which Georgia cultivated nearly 60 millions, and South Carolina more than 12 millions. The value of rice exported in 1840, was a little under two millions of dollars.

MILLET is, in some respects, in direct contrast with rice, but not so much in regard to the climate, for it is most abundant in warm countries, as because in light sandy soils, under the scorching rays of the sun, and in situations where sufficient moisture cannot be obtained for the production of rice, millet is successfully cultivated. *Sorghum*, its botanical name, forms a chief dependence of the people in some parts of India, through the arid districts of Arabia and Syria, where it has been produced from the earliest periods; in Nubia, whose inhabitants cultivate this almost to the exclusion of every other grain, and in central Africa. Millet is supposed to be originally derived from India. Of the two varieties of millet, the *German*, (*Sitavia Germanica*,) is cultivated in the north of Europe, as in Germany. The second variety, the *Italian*, (*Sitavia Italia*,) is undoubtedly a native of India, where it bears the name of congue. In Tuscany, this grain is used for feeding domestic fowls and animals, including horses. The Italians, also, make from the flour a kind of bread, which is dark-coloured and coarse. Parched Millet is the species most usually cultivated. The commonest variety, which botanists call *Sorghum vulgare*, is

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known in India by the name of *Jovaree;* in Egypt and Nubia, *dhourra;* and in the British West Indies, Guinea corn. Millet is cultivated largely in some parts of China, and in Cochin China. In the barren districts of Bornou, a species of millet is produced, which is called, by the inhabitants, *gussub*, and upon which both men and animals are almost exclusively fed. By the poorer class, it is frequently eaten, simply parched, or even without any culinary preparation. Other persons crush and then steep the seeds in water previously to eating them, and some few, who are the epicures of the land, clean the grain from the husk, pound it, and make it up into a light paste, with melted fat: this favourite dish is called "*kaddel.*" The Nubians are accustomed to prepare a fermented liquor from dhourra, which they call *bouzah*, and by them is considered to be a wholesome and nutritious beverage. The juice is often simply sucked from the stalk, which last, when dried, serves the purpose of fuel: its leaves afford food for cattle.

MAIZE, (*Zea Mays.*)—Indian corn has the widest geographical range of all the cerealia: it occupies a middle space between rice and wheat; flourishing with the former, in the tropical regions, and with the latter in more temperate latitudes. It grows luxuriantly at the equator, and as far as the 50th degree of north, and 40th of south latitude. It requires, for its most productive cultivation, a rich soil, and a moist and warm air, analogous to that for rice, and by which the grain of wheat would be subjected to rust and premature development and decay; at the same time, however, that it will grow, so as to meet the expectations of the husbandman, on lands, in more northern countries that are fitted also for the culture of wheat, which, in this case, alternates with corn in the rotation of crops.

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For the sustenance of man, corn is of scarcely less importance than rice. It forms a principal food of a large portion of the inhabitants of the United States, at a distance from the seaboard, from New England to Florida: it constitutes the bread-corn of the Mexicans, and people of Central America, and of South America, and its consumption in Africa is equal in extent to that of rice in the same quarter. In tropical America it bears the same relation to the food of the people, which rice does to those of the corresponding region in Asia. The Indians and Mestizoes, who form a large proportion of the inhabitants of Mexico, feed on maize and manihot (cassava), the consumption of wheat being principally confined to the white inhabitants of the towns. In southern Europe, particularly in Turkey and Italy, it is also largely grown, and even in France, contributes largely to the support of the people. The *poan* and *jöhnny-cake* are as familiar household words in North America, as those of *tortillas*, in Central America, in reference to cakes of Indian corn. A chemist, says Humboldt, would have some difficulty in preparing the innumerable variety of spirituous, acid, or saccharine beverages, which the Indians (of Mexico) and South America display a peculiar address in making, by infusing the grain of maize, in which the saccharine matter begins to develope itself by germination. These beverages, generally known by the name of *chicha*, have some of them a resemblance to beer, and others to cider. One marked advantage which Indian corn has over other grain, is its almost entire immunity from disease, such as mildew, rust, &c.

The quantity grown in the United States, in 1840, was 360 millions of bushels.

Wheat, (*Triticum.*)—This grain, by universal con-

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sent, is held in the highest estimation of all the cerealia. The bread made from its flour is preferred, wherever people have a choice between it and other farina; for wheat flour alone, by the gluten which it contains, is capable of ready fermentation, and, consequently, has more grateful flavour, and ready digestibility.

Some writers regard the plains of Thibet, and the adjoining regions of the Himalaya range, as the native country of wheat; but in this latter point there is no agreement of opinion. The progress of the culture of wheat has followed very much that of civilization, from the plains of Babylon and Egypt to Great Britain and North America. At present, although it is found in Persia, Northern India, Arabia, Nubia, Egypt, and Barbary, and even in Houssa, (Central Africa,) it yields, in the extent of its growth and cultivation, to rice and maize. In Southern Europe, as in Portugal, Spain, that part of France which borders on the Mediterranean, Italy and Greece, it alternates with maize, and occasionally, as in Lombardy, with rice. In the greater part of France, England, the southern part of Scotland, part of Germany and Hungary, Poland, Russia, and the lands of Western and Middle Asia, wheat is the chief grain with most of the people of these countries, and the principal material used for human food. In North America, wheat is cultivated from the table lands of Mexico to Upper Canada, in an almost uninterrupted line, if we avoid the low grounds of Louisiana and Alabama, and those of the southern Atlantic States, in some of which sugar, in others rice, has the preference as an article for agricultural labour. In South America, Spanish conquest, which was productive of so many atrocities, and the blackest injustice practised on the aboriginal inhabitants, brought with it some compensa-

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tion, by the introduction of the culture of wheat. The foundation of the wheat harvests in Mexico, is said to have been three or four grains, which a slave of Cortez discovered, in 1530, mixed accidentally with a quantity of rice. The name of the Spanish lady, Maria d'Escobar, wife of Diego de Alvares, who first imparted the same blessing to Peru, by conveying a few grains of wheat to Lima, and carefully distributing the produce of successive harvests, as seed among the farmers, is gratefully preserved in the records of history. The first grains of wheat which reached Quito, were conveyed thither by Father Josse Rixi, a Fleming, who sowed them near the monastery of St. Francis, where the monks still preserve and show, as a precious relic, the rude earthen pot wherein the seeds first reached their establishment.

In Mexico, the cereal grains are never cultivated, as we learn from Humboldt, at a lower elevation than from 2500 to 3000 feet above the level of the sea. This writer estimates that three hundred and ninety-six feet of vertical elevation in tropical regions, are equal to a degree of latitude farther north. There are, however, other circumstances independently of latitude and elevation, which determine the fructification of wheat; since in Guatimala, which is nearer the equator, and at a much lower level than the first wheat lands of Xalapa, this grain comes to perfection. The exposed situation of a district, and the prevalence of cool winds, serve to modify the adverse influence of a tropical latitude. Thus, Humboldt relates that he has seen in the province of Caraccas, the finest harvests of wheat near Victoria, (latitude 10° 13′ N.) at a 500 or 600 metres (1640 to 1960 feet) of absolute elevation; and it appears that the wheaten fields which surround the *Quattro Villas*, in

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the island of Cuba, (latitude 21° 58′ N.) have a still less elevation.

In New Holland, wheat is an abundant article of cultivation with the Anglo-Australian inhabitants of that immense region. This single fact would almost suffice to enable us to predict the wealth and power which await the descendents of its present inhabitants, of the white race.

"The finest samples of wheat are small in the berry, thin skinned, fresh, plump, and bright, slipping readily through the fingers." It is calculated that the average weight of the bushel of good English wheat is 58½ lbs., and that the average yield of flour is 13 lbs. of flour to 14 lbs. of grain. Another estimate is as follows:—A bushel of wheat of the average weight (60 lbs.) will yield, on being ground, of bread flour 47 pounds, fine pollard 4½, coarse pollard 4, bran 2¾; loss of weight in the process of grinding and dressing 2 pounds.

Whenever an abundant supply of good wheat converted into flour can be procured by a people, a favourable conclusion may be drawn of their health and capabilities of labour. Hence, in a hygienic point of view, the calculations of the average consumption, by each individual in a country, of wheat or its equivalent nutritive grain, are not without interest. The estimate made by Mr. Charles Smith, in 1765, of the annual consumption of grain reduced to the standard of wheat, being one quarter or eight bushels for each individual, is confirmed by later writers, and is thought by Mr. M'Culloch (Dictionary of Commerce, &c., Amer. edit.) to be applicable at the present time. He believes that the annual average amount of different kinds of grain consumed in the United Kingdom—Great Britain and Ireland—is not less than *forty-four millions* of bushels,

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exclusive of seed, and at *fifty-two millions* when it is included. The population in this calculation is supposed to be sixteen millions. In the above amount of grain, or corn, as the English writers call it, 1,860,000 quarters of peas and beans are included. The proportion of wheat in the whole is twelve millions of quarters. It is believed that a very large proportion, perhaps a half of the entire corn (grain) produced in the empire, is never brought to market, but is partly consumed by the agriculturist and partly used as seed, and in the feeding of horses, &c. The importation of grain into Great Britain was 3,500,000 quarters in 1831, which is above the average in former years. This amount is nearly equivalent to about a seventh of the entire produce brought to market in an average year, and must, as Mr. M'Culloch properly remarks, have a very material influence in alleviating the pressure of scarcity in a bad year, and in checking the rise of prices. The quantity of grain of all kinds sent from Ireland to Great Britain was, in 1835, 2,669,013 quarters, of which 661,776 quarters were of wheat, and 1,822,706 quarters of oats.

The proportion of persons fed on the different species of grain was estimated by Dr. Colquhoun in 1812 to be as follows:—Wheat, 9,000,000; barley, 1,500,000; oats, 4,500; rye, 500,000; beans and peas, 500,000. Of these the proportion to each person was of wheat, 1 quarter or 8 bushels; of barley, 1¼ or 10 bushels; of oats, 1¼ or 10 bushels; beans and peas, 1 quarter or 8 bushels. Mr. M'Culloch thinks that Dr. Colquhoun has underrated the consumption of oats by at least one half-quarter in the consumption of each of the 4,500,000 he supposes to be fed by them, or by 2,250,000 quarters, or 18,000,000 of bushels.

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The progressive increase in the growth of wheat in England during a period of about a century and a half, or from 1688 to 1828, is indicated by comparing the amount, fourteen millions of bushels, grown at the former date with 12,500,000 quarters or 100,000,000 bushels, at the latter. The population of England at the revolution (1688) was under five millions, so that each person consumed about three bushels annually. The population in 1828 was short of fifteen millions, so that each person consumed about seven bushels annually. The commonness of barley for bread in the earlier part of the seventeenth century is shown in Charles I. (in 1626) subjecting the brewers and malsters to a royal license, declaring that the measure was for the relief of the poorer sort of his people, whose usual bread was barley; and for the restraining of innkeepers and victuallers, who made their ale and beer too strong and heady. The grain to be saved by the weakness of the beer was for the benefit of the consumers of barley bread.

In France, the entire amount of all kinds of grain raised from the soil in one year, is estimated to be 62,221,205 Winchester quarters, (175,271,000 hectolitres.) Of this quantity, it is supposed that 16 per cent. is consumed in seed, 19 per cent. in the feeding of different species of animals, and 2 per cent. in distilleries and breweries. The amount of wheat grown in one year is 22,000,000 quarters. The proportion of grain to each individual in the kingdom is about ten bushels, or two more than is consumed in England. The growth of wheat and other grain in France is nearly equal to the consumption. Hungary, with a population of thirteen millions of persons, grows 105,000,000 bushels of grain, which, after deducting seed, and without supposing any wasted

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in distillation, would leave about 6½ bushels for every inhabitant. The deficiency in France, when it exists, is made up by importations from the Black Sea.

The two great corn (grain) markets of the north of Europe are Dantzic and Hamburgh. From the former city, which is the depot for the production of Poland, there was an average annual exportation, for twenty-five years, (from 1801 to 1825,) of 200,330 quarters of wheat, and 67,511 quarters of rye. In 1830, no fewer than 404,000 quarters were exported, of which 311,000 were to England. Rye is the bread-corn of the Poles.

From Hamburgh, the excess of the exports over the imports is less than might have been expected, amounting at an average of the 10 years ending in 1825, to only 48,263 quarters, or 386,104 bushels.

Much more grain than the above, mainly wheat, was supplied to Great Britain by impoverished Spain, (1831,) the exports from which were 158,000 quarters.

Odessa, in the Black Sea, is the only port in the south of Russia from which any considerable quantity of grain is exported. The amount, in 1824, was 427,747 quarters, of which 100,000 quarters are required by Constantinople. Sicily, once, with Egypt, the granary of ancient Rome, has barely a surplus for exportation.

The *United States*, with a vast extent of fertile country, and an agricultural population rapidly increasing, produce the cerealia both for home consumption and for exportation. The chief product exported is flour. During the year 1838, the quantity sent abroad was 448,161 barrels. Of wheat, the exportation amounted to only 6,291 bushels; whereas, forty-nine years preceding, or in 1790, there were 1,124,458 bushels of wheat, and 724,623 barrels of flour exported. The an-

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nual average of wheat exported during the above period was 209,666 bushels, and of flour during the same time, 877,000 barrels.

It appears that for the eight years, ending with 1838, the exports of wheat from the whole United States, were not as great as they were from Pennsylvania alone 100 years ago; nor, with only two exceptions, did they exceed in the last 25 years, the exports from Pennsylvania 60 years ago, while the average prices of both articles have probably increased three or four fold. It has been found also, that the exports of flour for the last few years have been less than they were 50 years ago, and that for several years, with few exceptions, there has been a gradual diminution in the quantity of exports of this article. On the other hand, viewing the inspections from the same districts of the United States, we find that they average nearly alike for the last ten years, rather diminishing, however, than increasing in quantity. (M'Culloch's Dict., Amer. edit.) We infer from this statement that the home consumption is greatly increased, and that every year there is a nearer approach to a par between the quantity produced and that consumed. Already, indeed, we have had experience of an inequality on the other side, viz: in the importation of foreign flour, wheat, and potatoes, owing to the shortness of the crop in 1838.

An inference might be drawn of home consumption from the inspections of this article at different places in the United States, compared with the quantity exported. The amount inspected for 1838, was 2,546,079 barrels; that exported was, as already stated, 448,161, which would leave a balance for home consumption of 1,097,818 barrels. But as large quantities of flour are consumed,

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even in the cities, which are not inspected, and as nearly all that is consumed in the interior escapes this supervision, the inspections reported give a very imperfect idea of the entire home consumption.—(*M'Culloch*, op. cit.)

The produce of the United States in wheat, in 1840, was eighty-five millions of bushels.

From *Canada*, the exports of wheat and flour to Great Britain, in 1835, were, of the former, 88,695, and of the latter, 48,811 cwt.

Barley (*Hordeum*).—Barley was largely used by the Greeks, and in the earlier ages of the Roman republic; and it was not until the Romans had learned to cultivate wheat, that they gave barley to their cattle. Pliny says, barley was the most ancient aliment of mankind. It was cultivated in Egypt nearly fifteen hundred years before Christ, (Exodus ix. 31.) The barley harvest is mentioned in the Book of Ruth; and its relative value, in 2d Kings, chap. viii. This grain ranks next to wheat, in Great Britain, of all the cerealia; and in Scandinavia and Siberia, as an article for food, takes precedence of it. In 1765, Mr. Charles Smith estimated the number of barley consumers in England and Wales to be 730,000; and, as a large proportion of the population of Wales, Westmoreland, and Cumberland continue to subsist chiefly on barley-bread, Mr. McCulloch thinks that this estimate may not, at present, be very wide of the truth. Pliny relates, that the Roman gladiators were called *Hordearii*, from their use of this grain as food. The principal demand for barley at the present time, in Great Britain, is for conversion into malt, to be used in the manufacture of ale, porter, and British spirits. It is also extensively used in fattening black cattle, hogs, and poultry. It now generally follows turnips; and is

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a very important crop, in the rotation best adapted to light soils. The most usual crop is from 28 to 36 or 38 bushels to the acre; it has been as high as 60 or 70 bushels. The average weight of a Winchester bushel, is between fifty and fifty-one pounds; and the produce in flour, is about twelve to fourteen pounds of grain.

In reference to the readiness of cultivation of this grain, whilst we learn, on the one hand, that barley is a tender plant and easily hurt, especially by much moisture, in any stage of its growth is more hazardous than wheat, and, generally speaking, raised at a greater expense; on the other hand, we are told, that it may be propagated over a wider range of climate than wheat itself, bearing heat and drought better, growing upon lighter soils, and coming so quickly to maturity, that the short northern summers, which do not admit of the ripening of wheat, are yet of long enough duration for the perfection of barley. It is the latest sown, and the earliest reaped, of all the summer grains. In warm countries, such as Spain, the farmers can gather two harvests of barley within the year: one in the spring, from winter-sown grain; and the other in autumn, from that sown in summer. In Lapland, the grain has been sown only a few days before midsummer, and the harvest was in the latter part of July; the whole process having occupied not longer than six weeks.

Barley is grown in the United States, to the north of Virginia, and also in Canada. The crop is generally from twenty-five to thirty bushels to an acre; and the average weight per bushel is forty-eight to fifty pounds, —the sale rate being forty-eight pounds. Barley, in this country, is generally grown for malting, but is not often made into flour; barley-bread being hardly eaten, except by a few European emigrants or their families.

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Small quantities are decorticated or hulled, and thereby converted into Scotch or pearl barley, which is used for food in soup, or as light nutriment in disease.

Barley is liable to disease, and consequent deterioration in the nutritive qualities of its grain, and even to produce positively noxious effects from eating the flour.

Barley, it has been already stated, is largely used for malt, which is the grain partly fermented and afterwards kiln-dried, prior to its conversion, by the addition of water and hops, into a beverage, called beer, ale and porter. This use of barley dates from the remotest times: it was known to, and practised by the Egyptians. Among the Greeks, beer was distinguished as *barley-wine*, a name which sufficiently identifies the intoxicating property of the liquid, and the materials whence this was drawn. Malt liquor, as we learn from the inquiries of Turner, (*History of the Anglo-Saxons*,) has formed an article of manufacture and consumption in England, for a period coeval at least with the time of Tacitus. The general drinks of the Anglo-Saxons were ale and mead: wine was a luxury for the great. After the Norman conquest, wine became more commonly used; and the vine was extensively cultivated in England. But the people held to the beverage of their forefathers, as was indicated by the burden of the wassail song of the fifteenth century—

"Bring us home good ale."

"The old ale knights of England," as Cambden calls the sturdy yeomen of England, knew not, however, the ale to which hops, in the next century, gave flavour and preservation. As late as Henry VIII., brewers were forbidden to put hops and sulphur into

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ale; but in the fifth year of Edward VI. (1552) the royal and national taste appears to have changed; for privileges were then granted to hop-grounds. In 1838, there were 55,000 acres in Great Britain occupied in the cultivation of hops. The quantity of malt on which duty was paid in the United Kingdom of Great Britain and Ireland, was 40,505,566 bushels. In the year 1836, it was 44,387,719. Tabular returns show, that the consumption of malt had been, if not stationary at least fluctuating, and without material increase during the century ending with 1810; in this year, the quantity of malt on which duty was charged, amounted to 26,889,183; and the annual average for ten years, ending 1723, the quantity was 27,336,000 bushels.

The quantity of beer, of all kinds, manufactured and sold in Great Britain and Ireland, taking the returns in 1830, the last that have been made out, owing to the duty being removed in that year, is upwards of *nine millions and a half of barrels*, of which the proportion made in Ireland would be about a *million of barrels*. The amount of home-made ale and beer is not known. It is computed, that about three and a quarter barrels of beer are manufactured from a quarter or eight bushels of malt. Another estimate is, that 400 quarters of malt make 1500 barrels of beer. The barley converted into malt would furnish farinaceous food, at the standard already mentioned of ten bushels of barley to each individual, for four millions fifty thousand persons annually. The number of acres taken up with hops, viz. 55,000, would provide grain and farinaceous food for a hundred and sixty-five thousand persons,—estimating the products of the land as averaging 30 bushels of barley to the acre. The manufacture of beer and spirits then, in the United Kingdom, causes a direct annual abstraction

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of the best and most substantial vegetable nutriment, or that of the cerealia, equal to what would supply four millions two hundred and twenty thousand persons. The adulteration of malt liquors, by various bitter and narcotic substances, is a farther question of dietetics, which will engage attention under the head of drinks, in a subsequent part of this volume.

In the United States, breweries are established and in full operation in the chief northern cities, as also in the towns on the banks of the Hudson and the Ohio. Large quantities of malt liquors are exported from the Northern to the Southern States. We must hope that the quality of the American is superior to that of the British ale and beer. I am not apprised either of the quantity of grain malted, or of fermented liquor made from it in the United States.

RYE (*Secale*).—The native country of rye is said to be Candia (Crete); but of its history in this respect we know as little as of the other cereal grains. Rye has been cultivated from time immemorial; and it is considered to come nearer to wheat than any other grain. It is the bread-corn of Germany, Northern Russia, Sweden, and the southern part of Norway, and is still eaten in parts of England. With the exception of wheat, rye contains a greater proportion of gluten than any other of the cereal grains, to which it owes its capability of being converted into a spongy bread. It contains also, like barley, nearly five parts in a hundred of ready-formed saccharine matter, by which it is in consequence easily converted into malt.

Rye is the common bread-corn in all the sandy districts to the south of the Baltic Sea and the Gulf of Finland, furnishing abundance of food for the numerous inhabitants of places, which, without it, must have

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been little better than sandy and uninhabitable deserts. In these districts, it not only forms the chief article of consumption, but furnishes an export of some consequence to the trade of the Baltic ports. From Dantzic, there were exported, on an average, during each of the two years, 1829 and 1830, six hundred and fifty thousand bushels of rye, nearly three-eighths of which were to Holland for distillation into gin; and from Riga, in 1832, more than four hundred thousand bushels. The abundance of rye in Northern Russia, is manifested by the exportation from Archangel of more than a million of bushels of this grain in one year (1832); that of wheat for the same time, being under two hundred thousand bushels. From St. Petersburgh, nearly three hundred thousand bushels of rye were exported in 1832; and not much below a million of bushels in the preceding year. In the United States, a good deal of rye is converted into whisky by distillation. Unmalted rye-meal is mixed in Holland with barley malt, in the proportion of two parts, by weight, of the former with one of the latter; and the whole being fermented together, forms the wash, from which is distilled, flavoured with juniper, all the grain spirit produced in that country, and known throughout Europe as Holland Geneva.

The peasantry of Sweden subsist very generally upon rye-cakes, which they bake only twice in the course of the year, and which during most part of the time are consequently hard as a board. Even in more than half of France, rye-bread, either pure or mixed with wheat in equal proportions, is the only kind to be procured. The mixed grain, of wheat and rye (meteil), is sown and reaped, and bread made of the two, ground into flour: that grown in Cham-

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paigne is preferred in Paris. Starch enters largely into the composition of rye-flour. M. Einhoff found that 3,840 parts of the latter yielded 2,354 of starch. Sir Humphrey Davy's analysis gives 5 per cent. of gluten, that proximate principle which prevails in wheat, and on which the superior nutritive properties of this grain depends. The former of these chemists estimates, that there is 70 per cent. of nutritive matter in rye. Davy's calculation is, 79 for rye; for wheat, 95, of which last, he supposes, there are 19 parts gluten.

The quantity of rye produced in the United States in 1840, was nearly seventeen millions of bushels. Rye is subject to a disease, called *spur* or *horn*, by which the grain, then called *ergot*, is rendered positively poisonous. In some years, an extensive and alarming disease and mortality have ensued from the use of rye-meal, in which the diseased grain was ground-up with the healthy.

Oat (*Sativa*).—If rice be the most southern or tropical of the cerealia, oat is decidedly the most northern, and its growth is as incompatible with a warm as that of rice is with a cold climate. Oat is the hardiest of all the cereal grasses, growing luxuriantly in cold northern climates, and in coarse mountainous districts, where neither wheat nor barley can be advantageously grown. It is, however, cultivated in Bengal, as low as the 28th degree of latitude. In Scotland and Ireland, where it has long formed a principal part of the food of the people, it is more cultivated by far than any other species of grain, in the proportion of ten bushels to one. The produce of the oat is exceedingly variable, being in poor soils not more than 20, but in rich ones as much as 64, 72, and even 80 bushels an acre.

The common and almost general mode of using oat-

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meal, as nutriment, by the people of Scotland and Ireland, is to boil it with water into a thick consistence, forming *porridge* or *stirabout*, and, also, to convert it by moistening it with water into a dough which is made into thin cakes, and baked in an oven or before an open fire. These two preparations of oatmeal, with the alternations of potatoes, make up almost the entire food of the peasantry of Ireland, and as we learn also of the Highlands of Scotland. The habitual beverage with these people is water. Whisky is consumed at harvest times, convivial meetings, and at markets and fairs; that is to say, their drink for labour is water; for frolic, dissipation and riot, it is, or happily we can now say, since the labours and success of Father Mathew, used to be, whisky.

It was computed in 1765, by Mr. Charles Smith, that there were 623,000 persons consumers of oats in England and Wales. The number has probably declined since then; for, although the growth of oats has increased, this is to meet the demand for its use as food for horses. The export of oats from Ireland, chiefly if not entirely for the English market, was, in 1825, 1,503,204 quarters, or 12,025,632 bushels; and in the state of meal, 204,617 quarters, or 1,636,936 bushels, during the same year. In France, about 90 millions of bushels is produced, of which 25 millions of bushels are used by the inhabitants for food, chiefly in the southern part of the kingdom. Oats yield, on an average, 8 lbs. of meal for 14 lbs. of the grain.

Although oats be chiefly a northern grain, it is grown largely in southern Russia, and shipped in considerable quantities from Odessa. It has even been cultivated in the high lands of Bengal.

Oats have been used to make malt for the purpose of

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brewing. In former and comparatively untaxed days, says Mr. Mowbray, writing in 1830, malt was currently made from wheat and oats likewise. Wheat malt produces a strong-bodied, fine and high-flavoured liquor; oats a light, mild, and pleasant beverage. I have heard, continues Mr. M., much commendations of oat-ale, as a summer drink, but have never tasted it. Few opportunities are given, we believe, in the present day, for ascertaining the merits of oat-ale. In former times a drink called *mum* was manufactured for sale, in the preparation of which oatmeal was employed. English Geneva or gin is made of spirit obtained from oats and barley or malt, rectified or distilled with the addition of juniper berries, oil of turpentine, &c. It has been computed (Ure's Dictionary of Arts and Sciences) that 100 lbs. of oatmeal will yield by distillation 36 lbs. of spirits.

In the United States there were about 100 millions of bushels of oats grown in 1840, of which New York produced upwards of twenty millions, and Pennsylvania also upwards of twenty millions.

Buckwheat (*Polygonum Fugopyrum*).—The native country of buckwheat is supposed to be Asia: it was cultivated in England in the latter part of the sixteenth century. It is not as extensively used as any of the other cerealia for the nutriment of man. Indirectly it contributes to this end by its furnishing a food of which all animals are fond, and on which they will thrive. When given to cows it causes them to yield an abundance of excellent milk, which makes good butter and cheese. Occasionally, however, the flour of buckwheat is used for bread, but more frequently for thin cakes raised with yeast. In Germany, it is used as an ingredient in potage and puddings; and in some countries, the poor mix the meal of buckwheat with a small

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proportion of wheat flour, and make a kind of bread of the compound. In Brabant, and in some parts of the United States, it is not unusual for persons who derive a profit from keeping bees, to sow this grain near their dwellings, under the belief that these insects are partial to the flowers and derive more materials for their honey than from any other plant.

Buckwheat is capable of being converted into malt, and of subsequent manufacture into beer and ardent spirits. In Dantzic it is made considerable use of in this way.

In some of the United States, the quantity of buckwheat produced is considerable. In Pennsylvania, it amounted, in 1840, to 2,113,742 bushels; in New York, to 2,287,885; in Virginia, to 683,130; and in Ohio, to 681,215. The produce of the different States collectively was somewhat short of *eight millions and a half* of bushels. In France, there is raised annually about 25 millions of bushels of buckwheat; the people in parts of the kingdom use it to a considerable extent for aliment.

Wild Rice (*Zizania Aquatica, Fatuus Avena*),—Called by the Indians menomene, is found in the greatest abundance on the marshy margins of the northern lakes and waters of the upper branches of the Mississippi: it grows also as far south as Natchitoches, below 32° lat. The grain has a long slender hull, much resembling that of oats, except that it is longer and darker. On it the migratory water fowls fatten, before they wing their autumnal flight to the south. It furnishes the northern savages and the Canadian traders and hunters with their annual supplies of grain. But for this annual resource they could hardly exist. The wild rice is a tall, tubular, reedy, aquatic plant, not unlike the bastard cane of the southern countries. It springs up from waters of six or seven feet in depth, where the bottom is soft and muddy; and it rises nearly to the same distance above the water. The grain, when detached from its chaff, is as white as the common rice. Mr. Timothy Flint (*History and Geography of the Mississippi Valley*), from whom I derive the foregoing particulars, concludes his account by saying,—"Puddings made of it, tasted, to us, like those made of sago."

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CHAPTER VI.

VEGETABLE FOOD (*continued*).

Different methods for preparing the Cerealia for Food—Bread from wheat, the best and most nutritive—Good bread defined—Effects of the addition of yeast—Fermentation owing to the sugar—Formation of carbonic and acetic acids and alcohol,—this last in small quantity and soon evaporated—Articles added to remove acidity of bread—Other articles—Alum,—means of detecting it—Blue vitriol; its effects on the dough,—means of detecting it—Salt, its use—Potatoes and potato-starch mixed with wheat flour—Details of trials and experiments on this subject in France—Household bread—Bran bread—Warm and fresh bread injurious—Pap—Rice added to wheat flour—Proportion of flour to bread—Ginger-bread—Rye-bread—Mixture of rye and wheat to make bread—Rye-mush—Barley,—barley-flour, and barley-water—Oat-meal, its various uses,—gruel from—Rice, its advantages as an article of food,—use of in disease,—preparations of—Maize,—bread from,—gruel—Buckwheat,—mixture of with barley and rye.

After having spoken of the geographical range and the relative quantity grown of the different cerealia, as well as of their alimentary application, it may not be amiss to say something of the different modes of preparing them for bread, as regular nutriment, or as drinks, jellies, &c. for the diet of the sick and the invalid.

The kind of bread most highly prized, both for its agreeable taste and nutritive properties, is that made from wheat-flour. This last possesses in itself all the requisite elements for panification, viz: starch, the chief

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nutritive element in all the cerealia, sugar for fermentation, and gluten to retain the air evolved, and to give the requisite lightness and porosity to the entire mass. "Good bread ought to be composed of flour, well kneaded with the lightest water, seasoned with a little salt, fermented with fine yeast, and sufficiently baked at a proper heat. When baked, it ought to appear through a glass like a honeycomb, full of cells, yet the intermediate parts constituting a uniform substance of a gelatinous nature which readily unites with an aqueous menstruum." A paste of flour and water, mixed together and exposed to heat, will undergo a kind of fermentation analogous to that caused by yeast; and a portion of it thus changed will act as a leaven to fresh dough instead of yeast. There is greater risk, however, of the bread being sour when fermented with leaven than with yeast, and the process of panification is slower. The part which the gluten of the flour performs in the making of bread is well illustrated by the following remarks of Dr. Ure (Chem. Dict.): "This flour paste may indeed be regarded as merely a viscid and elastic tissue of gluten, the interstices of which are filled with starch, albumen and sugar. We know that it is from the gluten that the dough derives its property of rising on the admixture of leaven. The leaven acting on the sweet principle of the wheat, gives rise in succession to the vinous and acetous fermentations, and of consequence to alcohol, acetic and carbonic acids. The latter gas tends to fly off, but the gluten resists its disengagement, expands like a membrane, forms a multitude of little cavities, which give lightness and sponginess to the bread. For the want of gluten, the flour of all those grains and roots which consist chiefly of starch, are not capable of making raised bread, even

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with the addition of leaven or yeast." Dr. Ure, and he is not singular in his opinion, says, that "there does not appear to be any peculiar fermentation to which the name *panary* should be given." The evolution of alcohol during the process of fermentation of dough and until it is adequately baked into bread, suggested to some persons, a few years back, in England, the idea of framing an apparatus, by which the alcohol could be retained, and a kind of distillation in fact carried on simultaneously with panification. But the results did not harmonize with the preconceived notions on this subject;—the quantity of alcohol was too small, as it was not the product of the conversion of the starch into sugar, and this again into vinous fermentation and alcohol, but merely of a portion of the small quantity of sugar originally in the flour. None of the alcohol remains fixed in the bread.

More injury to the quality of the bread is to be apprehended by the retention of the acid, which not being volatile cannot escape, like the alcohol, by evaporation; and this evil is especially liable to occur, if the flour be not fresh, nor originally of a good quality. Correctives are found in the addition of small quantities of subcarbonate of ammonia, (volatile alkali,) or of the common carbonate of magnesia, by which not only the acidity is prevented, but the bread is improved in quality. Dr. Davy has made a number of experiments, by mixing carbonate of magnesia with flour; and he has fully satisfied himself, that loaves thus made "rise well in the oven, and, after being baked, the bread is light and spongy, has a good taste, and keeps well. In cases where the new flour is of an indifferent quality, from twenty to thirty grains of carbonate of magnesia to a pound of the flour will con-

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siderably improve the bread. When the flour is of the worst quality, forty grains to a pound of flour seem necessary to produce the same effect."

Alum is another article frequently, we may say commonly, used by the English bakers,—in the proportion of two ounces of alum to five bushels (or a sack) of flour.

Mr. Accum (on Culinary Poisons, p. 132) tells us, "From experiments in which I have been employed, with the assistance of skilful bakers, I am authorized to state, that without the addition of alum, it does not appear possible to make white, light and porous bread, such as is used in this metropolis (London,) unless the flour be of the very best quality." This practice is not, we may hope, common in this country: as such a bread, though it may not affect sensibly those who are in health, must exert an injurious influence on those whose digestion is torpid and impaired by costiveness.*

* The presence of alum may be detected as follows:—

Accurately mix the crumbs of stale bread in water, squeeze the pasty mass through a piece of cloth, and then pass the liquor through a filter paper: the limpid infusion resulting will, if it contain alum, exhibit a white cloud, more or less dense, on adding to it a dilute solution of the muriate of barytes. This is the process recommended by Dr. Ure. A more accurate one is pointed out by M. Kuhlmann, (*Annales d'Hygiene et de Med. Leg.* t. v. p. 346.) He directs a certain quantity of bread, about six ounces, to be reduced to ashes, and these minutely pulverised in a porphyry mortar; they are then to be treated with nitric acid, evaporated to dryness, and the residue mixed with two or three drachms of water. To this liquid is to be added a small excess of potassa; it is next to be heated and filtered, and the addition of sal ammonia (hydrochlorate of ammonia) to the liquid in a boiling state will precipitate the alum. An opinion may be formed, approximatively, by the weight and volume of the ashes, which are both weightier and bulkier from alum bread than pure bread, of the same weight.

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White vitriol and blue vitriol have, also, been used by bakers in Europe. The latter salt (sulphate of copper) has more especially engaged the attention of the French chemists within the last twelve years. Its use would seem to be more common in Belgium, and in the adjoining provinces of France, than in other parts of this latter kingdom. It manifests effects, when mixed with dough, very analogous to those of yeast, by giving the requisite consistence to the dough to retain the bubbles of gas, and thus to render the bread more porous. If the salt of copper be added in excess, it produces an effect similar to that of yeast, in giving rise to the same kind of smell which is caused by this latter in excess. More sensible effects, on the fermentation and rising of the bread by means of the blue vitriol or salt of copper, follow the addition of a very minute quantity, as one of the salt to 300,000 of bread, or one grain to seven pounds and a half of bread. Double this quantity causes the greatest rising. Beyond this a contrary effect is observed: the bread is flat and moist. Several of the Belgic bakers and some of the French, have been punished for this fashion of adulterating bread. The copper is the agent in the above process, for other sulphates and sulphuric acid have no action on dough.* It may be inferred, therefore, that white vitriol (sulphate of zinc) has not been used to the extent or for the purpose alleged, in connection with making bread.

* The presence of copper in bread is ascertained by M. Kuhlmann, in the following manner. Some of the suspected bread is to be reduced to ashes and treated in the same way as for the detection of alum, until that step is reached, in the process already described, in which the filtered liquid is obtained. To this, ammonia in excess is to be added, and then some drops of a solution

The subcarbonate of magnesia, according to M. Kuhlmann, produces no effect on the rising of bread. The subcarbonate of ammonia has little influence over the rising, as it is converted into an acetate by combining with the free acid in the dough.

Common (marine) salt exhibits the same properties as the alum and salt of copper, but in less degree: it never gives such white crumb, but the bread into which it enters is far better than that which comes from a loaf in which either the sulphate of alumen or that of copper (alum or blue vitriol) are present: the latter resembles more a piece of light cake than bread, and it has but a slight flavour.

Adulteration of bread by the addition of the carbonates of potassa and soda, sometimes practised in order to prevent the bread from becoming soon dry, is easily ascertained by the greater degree of alkalescence of the ashes; those from pure bread are very slightly alkaline.

Other less hurtful but still obnoxious adulterations of bread, or of the flour from which it is made, have been practised in Europe; such by adding plaster of Paris, chalk, whiting and burnt bones. A common mixture, in the old world, which only deserves the name of adul-

of the carbonate of ammonia. The white precipitate thus procured, is to be separated by the filter; and the liquid reduced to a fourth of its quantity (volume) by evaporation, which carries off, at the same time, the excess of ammonia. Into this liquid a few drops of nitric acid are introduced, and then two separate portions are to be treated; the one by the ferrocyanate of potassa (prussiate of potash), and hydrosulphate of potassa, (liver of sulphur.) If the bread contained even one seventy thousandth part of copper, the liquid on the addition of the first of the tests will immediately assume a rose colour; and of the second a greenish tint, and at last a brown precipitate.

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teration when it is concealed, and not sold at a price corresponding with the cheapness of the article added, is of potatoes or potato starch with flour. In France, and some other parts of the continent, and in Great Britain too, it is a question of very great moment, to ascertain the cheapest bread, compatible with salubrity and good flavour, that can be made for the poorer classes.

In some parts of France they mix potatoes, previously boiled peeled and mashed, with wheat flour, in order to make bread; and so long as the proportion of the former to the whole quantity, does not go beyond a fourth, the result is satisfactory. Equal parts of potatoes and flour will not answer: the mixture results in close, hard and unpalatable bread of difficult digestion. But even attempts of this nature, imperfect as they are, have done much good in years of scarcity, as in those which came after 1815, in France. In the year 1816, the idea occurred to several bakers to add fresh potato starch to their flour; and, accordingly, by suitable mechanical contrivances, they procured a complete mixture of the two, and made a bread with it of which the consumers did not complain, and which the government tacitly authorized. M. Labiche, one of those then in office, assured the editors of the *Annales d'Hygiene*, &c., that by this means the danger of famine, with which the capital was threatened, was warded off. During the years which preceded 1832, notwithstanding importations to a large amount, the market price of flour was quite high, and the bakers again had recourse to the potato, the dried starch of which they mixed in the proportion of five to ten per cent. with flour, without dissatisfying their customers. But the millers having learned what had been done, thought that they might increase their profits, and mixed potato starch, to as

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great an extent as possible, with their flour. The bakers this time were the complainants. It was found difficult to incorporate with flour more than twenty per cent. of fecula or starch; this latter, being heavier than flour and being acted on by cold water, was sometimes deposited, and formed numerous doughy lumps.

M. Ganal so far improved the process of simple mixture, as to be able to incorporate with the flour, fifty per cent. of potato fecula, and afterwards procured a bread sufficiently raised by the addition of sugar and barm. After all, notwithstanding every care in making the mixture, it is never so perfect as to prevent lumps of fecula; and the sugar and barm impart a flavour which is not much liked. A still farther advance was made by the liquefaction of starch with malted barley, so that a third of dextrine could be incorporated with the dough and good panification result. During the process, the malted barley does not merely separate the dextrine from its teguments, but converts it into sugar of grapes, and it is very difficult to give any uniformity to the entire manufacture of bread in this way.

M. Lebaillif exhibited to the French Academy of Sciences, a bread of fine appearance, composed entirely of starch; it united the external requisites, whiteness and lightness; but the complete absence of all animal matter has its inconveniences; and the taste differs so much from that of common bread, that it is doubtful whether people could accustom themselves to it. The animal matter here referred to is gluten, which contains among its ultimate elements azote, the chemical characteristic of animal organization. Unless azote enters some way or another into the composition of the food of man, he is imperfectly nourished.

The two gentlemen, (Dr. Bouchardot and the Duc de

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Luynes,) whose history of the experiments on potato fecula, as regards its incorporation with flour, I am repeating, were induced to review the substances whose properties, by spontaneous alteration, were analogous to those of gluten; and they fixed their attention on caseum. Among the immediate principles of gluten, it has been already said that vegetable albumen is one; and we may now add, that its resemblance to caseum is, in many respects, considerable. Having rendered caseum soluble, by the addition of bicarbonate of soda, they added to it fecula, in the proportion of twenty parts of the former to one hundred of the latter,—then had the mixture exposed two days to the sun, and sent to the mill to be ground. Out of this flour a very passable bread was made, with the addition of yeast; and if pains be taken, by prolonged kneading and beating, and the addition of water moderately warm, and but a little yeast, and by watching the dough and putting it in the oven before it is completely raised, quite a good bread will be the result of the process. (*Ann. d'Hygiene*, &c. t. XI.)

By grinding the starch and wheat, previously mixed, together, the union between them is so intimate, that a much larger proportion of starch than before can be introduced in the preparation of bread,—even to an equality with the flour, and as far as two parts of the former to one of the latter. Equal success attended the trials by mixing potato starch and meslin (*meteil*) wheat and rye, to make good bread.

The experimenters above-named point out the means of removing the peculiar taste which starch communicates to bread; viz. by heating it on iron plates. Equal parts of wheat and potato starch, mixed together, and then ground at the mill, yield a flour which, by the common processes, makes very good bread.

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Notwithstanding the abundant crops of wheat in the United States, adequate in general to all the alimentary wants of the people, it may happen, as it has but a few years ago happened, that the supply is short of the demand; and hence it might be a question of some moment to procure bread at a cost which will not be too onerous to the industrious working yet poor man. The above statements will on this account be thought not devoid of interest to the intelligent and philanthropical reader.

A good household bread is directed to be made as follows:—Put a quartern of flour into a large tub, with two or three spoonsful of salt; make a hole in the middle; then put in a basin four table-spoonsful of good yeast; stir in a pint of milk, lukewarm; put it in the hole of the flour; stir it just to make it of thin batter; then strew a little flour over the top; set it on one side of the fire and cover it over; let it stand till the next morning—then make it into dough; add half a pint more of warm milk; knead for ten minutes, and then set in a warm place by the fire for an hour and a half; then knead it again, it is ready either for loaves or batches; bake them from one hour and a half to two hours, according to the size.

A variety of processes is used by cooks, confectioners, and others, to make cakes, puddings, and other kinds of bread, in which different qualities are required. Some cakes are rendered brittle, or, as it is called, *short*, by an admixture of sugar or of starch. Another kind of brittleness is given by the addition of butter or of fat. White of egg, gum-water, isinglass, and other adhesive substances, are used, where it is intended that the effect of fermentation shall expand the dough into an exceedingly porous mass.

There are varieties of wheat bread according to the qualities of the flour,—as when it is made of the finest bolted flour, or of the coarsely bolted, or when all the bran is retained. This last kind, or bran bread, is recommended to, and often used by dyspeptics, particularly to obviate costiveness, and at times with good effect in torpid habits. On the contrary, in persons whose digestive canal has much sensibility, this coarse bread, as it can never be made by mastication and the action of the stomach completely homogeneous, is apt to irritate and give imperfect nourishment. Bread, on the other hand, made of very fine flour, is apt to form a cohesive mass, after imperfect mastication, and is less readily acted on by the stomach than where the particles are coarser.

Much of the goodness of bread depends on the dough being well kneaded; and the chief cause of the ill flavour and heaviness of much home-made bread is from the neglect of the cook or over-hurried housewife, in this respect. Machinery has been introduced in France and England, to take the place of hand work, for the mixing of flour with water and yeast, and the thorough kneading of the dough afterwards. In summer, when the leaven or the yeast, and even dough, is apt to become sour, a previous addition to the flour of either the bicarbonate of soda or the carbonate of magnesia in the manner already described, will prevent sour bread.

Bread yet warm, or even recently from the oven, is unwholesome, especially to all those in civic life whose exercise in the open air is limited; it is most prejudicial to the dyspeptic, and to those who, without acknowledging themselves to be on this list, suffer frequently from sick headache, or occasionally from pain or spasm in the stomach. The morbid effects of hot bread are greatly increased by butter melted on it. Of

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the same injurious nature is hot buttered toast; that is, toasted bread on which, while it is yet hot, the butter is spread, and into which it penetrates. The time at which warm bread is taken, makes, as in the casé of every substance of difficult digestion, a considerable difference, and hence a meal of this kind in the morning will often only cause a feeling of uneasiness and some oppression at the stomach; but in the evening will, in those any way predisposed, be apt to bring on violent spasms, or be followed by disturbed sleep, and distressing dreams, with headache and disordered bowels on the following morning. There are instances of sudden death caused by a full meal of warm bread. As a general rule, bread should not be eaten until the day after that in which it comes out of the oven.

Wheat flour boiled with milk, (pap or milk porridge,) and sweetened, is nourishing aliment for invalids who are not troubled with fever, and is largely given to infants. When there is fever or costiveness, or a dysenteric state of the bowels, this pap should be omitted, and the child fed with either simple rice or arrow-root boiled into a jelly and sweetened; or if there is no fever to forbid, cream may be added advantageously.

Rice is a good addition to the flour of wheat in preparing bread. A quarter of a pound of ground rice boiled and mixed with three quarters of a pound of flour, and made into dough in the water in which it was boiled, gives one pound fourteen ounces of bread; but the same quantity of bread made in the common way would require one pound and a quarter of flour. Beans added to wheat flour make a nutritious bread at less cost than if it were made from the latter alone. Five pounds of bean flour made with a decoction of beans, and this last then kneaded with fifty pounds of flour, and worked as usual with salt and yeast, gives ninety-three pounds of dough, which on being baked produced eighty-two pounds and three quarters of bread. Fifty-five pounds of flour made with dough in the common way, produced sixty-nine pounds and a half of bread; hence, by the former process, there was gained one-fifth or fourteen pounds.

The English estimate of the proportion, in weight, of bread to flour, is, that the sack of 280 lbs. of flour will make on an average 86 quartern loaves, or 347½ lbs. of bread; but as flour varies in its power of absorbing water, so a sack of ordinary flour will sometimes make 86 loaves by absorbing 34 lbs. 2 oz. of water more than in the former case.* The mistresses of families in London exert themselves to confine the consumption of bread to six pounds a week for each person in the family, or about 13½ oz. daily. If rolls or other bread is bought, or much flour consumed in puddings, the quantity of bread is lessened.

Gingerbread is made in such a way that the fermentation is checked by the molasses or treacle used in its preparation. As Dr. Colquhoun, in his work on Bread, has not thought it beneath him to give more than one receipt for making gingerbread, exception will scarcely be taken to my giving his last, viz:—Flour, 1 lb.; molasses or treacle, ¾ lb.; raw sugar, ¼ lb.; butter, 2 oz.; carbonate of magnesia, ¼ oz.; tartaric acid, ⅛ oz.;

* The bulk of wheat is almost doubled by its being ground. The following are the proportions and varieties of product after grinding. If we suppose 8 bushels or 32 pecks of wheat to be subjected to the process, there will come out 5 bushels 3 pecks of fine flour, 2 pecks of seconds, 1 peck of fine middlings, ½ peck of coarse middlings, 3 bushels of 20 penny flour, 2 bushels of pollard, and 3 bushels of bran, being in all 14 bushels 2½ pecks.

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ginger, ⅛ oz.; cinnamon, ⅛ oz.; nutmeg, 1 oz. The substitution of magnesia for potash, recommended in some receipts, has the advantage of being more salubrious, and also, by the increased proportion in which it is used, of rendering bread ready for the oven in shorter time. By disengaging the carbonic acid from the magnesia by tartaric acid, gingerbread may be got ready for the oven in less than an hour.

Of the other cerealia, the rye is that, the flour of which is most commonly mixed with the wheaten. In France, it is quite common to sow and reap the two together, and to send the product to the mill and have them ground together. This mixture (*meteil*) makes, with leaven, a good, nutritious, and not unpalatable bread. In case the rye and the wheat should have been procured separately, the proportion for mixture is recommended to be from one-third to one-half rye.

Rye comes next to wheat in its facility of panification, but is still inferior to the latter in this desirable property. Rye-bread has one great advantage, in its retaining its humidity at the same time that it preserves its flavour. When made of flour not too finely bolted, rye-bread is suitable to certain forms of dyspepsia with costiveness, and the subjects of which are of a sanguine temperament. Spiced rye-cakes were, for a long period, greatly in vogue in Europe—from the time of the Romans to that of Louis XIV.

The diseased grain of rye, or ergot, ground with the sound grain, and eaten in bread, has caused alarming and, in some instances, extensive and fatal diseases.

Rye-meal, boiled in water, (rye-mush,) is often recommended by physicians, to be taken with milk, or in worse cases with molasses, for breakfast, to obviate constipation. In certain surgical cases, this simple regimen obviates many difficulties.

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Barley, which in both ancient and modern times preceded wheat as a bread-corn, does not, owing to the small quantity of gluten in its flour, make good bread, so far at least as lightness and porousness are concerned. It is now little used.

The husk or skin of barley is acrid and slightly laxative. Deprived of this, the grain, to which then the name of Scotch or pearl barley is given, is highly nutritious and bland. Its aqueous decoction, or *barley-water*, as it is called, is demulcent and easy of digestion, and, especially when acidulated with lime or lemon juice, is a very refreshing drink in feverish conditions of the system. Barley-water and rice-water, are the two drinks peculiarly adapted to disordered digestion, marked by pain, thirst, and looseness of the bowels. The directions for making barley-water are as follows: Pearl barley, two and a half ounces; water, four pints and a half; first wash away with water the foreign matters adhering to the barley seeds; then half a pint of water being poured on them, boil the seeds a little while. This water being thrown away, pour the remainder of the water, first made hot, on them: boil down to two pints and strain.

Of late years, the barley-flour made from the pearl barley has, to a certain extent, taken the place of this latter. Barley-water is made by mixing a tablespoonful of this flour with two tablespoonsful of cold water, then add one quart of boiling water: boil for ten minutes, and then strain through thin muslin. Sweeten and otherwise flavour as may be desired.

Count Rumford regards barley-meal as being three or four times as nutritious as wheat-flour. In repeating the opinion, I do not vouch for, but rather doubt, its accuracy.

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Oat-meal is not susceptible of panification; but is made into thin cakes, with water, sometimes with milk and aromatic seeds, and baked before the fire. Prepared in the first-mentioned fashion, and boiled with water to a tolerably thick consistence (porridge), it constitutes, as already mentioned, the chief and sole cereal nutriment of a large proportion of the people both of Ireland and Scotland. A more delicate and savoury preparation, called sowans, is made by allowing the coarser meal and bran to ferment in water, until the fluid is slightly acid; it is then strained and boiled. On cooling, it forms a kind of jelly, which, eaten with milk or cream and sugar, is quite palatable. Oat-bread sometimes causes heartburn and other dyspeptic symptoms.

In England and the United States, the knowledge of oat-meal is almost entirely derived from its use in the preparation of gruel, a light liquid aliment, and, on occasions, a drink, which is taken with much benefit in a great number of morbid conditions of the animal economy. It is often drunk after purgative medicines, to aid their operation, and mitigate, at times, their violence. Water-guel is prepared, by first mixing well two tablespoonsful of oat-meal with six of cold water in a basin, and then adding this gradually to a quart of boiling water, constantly stirring it until it is sufficiently boiled, which will be in about ten minutes. On taking it off the fire, it is to be strained; if it is desired to have it quite clear, it may, when cold, be decanted from the sediment. Sugar, acids, or aromatics may be employed for flavouring. A more nutritive gruel being required, a pint of boiling milk may be added to a pint of water, in which the oat-meal has been previously well mixed, and the whole is then to be boiled for five minutes,

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stirring it carefully all the while to prevent the oatmeal from burning at the bottom of the pan; and afterwards to be skimmed and strained through a hair sieve. This may be sweetened and otherwise flavoured, in the same manner as directed for water-gruel.

A decoction or infusion of wheat-bran, prepared similarly to water-gruel, is sometimes used by invalids as a demulcent in catarrh, and to keep up a relaxed state of the bowels.

Rice, owing to the almost entire absence of gluten in its composition, is unfitted for panification; but although so inferior to wheat in this respect, it has some marked advantages over all the other cerealia, viz: in its bearing transportation so well without change or deterioration, and, owing to its having no bran, in the readiness with which it can be served up for alimentary use after simple boiling. Hence, rice ought to form part of the stores in every long voyage. If we desire to know the various fashions of preparing it for aliment, so as to please the palate without loss of its nutritive properties, we ought to consult the records of Indo-Chinese cookery. A common dish with the people of the East, is *kicheri*, or rice boiled and dressed with lentils or with small beans. Rice torrefied, and the central part of the grain exposed, and then boiled in a small quantity of water, and pressed into a kind of cake before the grain becomes dry, may be preserved for a length of time, ready for immediate use. The common and simplest form of preparation, is by boiling the rice in a moderate quantity of water until it becomes softened, and the liquid white and slightly consistent. This is *congee*, as familiar to the Hindoos as porridge to the Irish, polenta to the Italians, or mush to the Americans. Rice eaters are content with this simple food, slightly seasoned

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with some aromatic or spice; they drink water, and are ignorant of that multiplicity of animal aliments, which become so frequently a cause of disease to Europeans and Anglo-Americans.

Rice nourishes with such little irritation and with so little excremential residue, that persons, unaccustomed to its use, cannot persuade themselves of its adaptation to their own cases, even at the very time that it is both mitigating their disease and renovating their exhausted strength. In the forming stage of violent disease, as well as in lingering maladies of less intensity, a restriction to a rice diet will often singularly mitigate the former, and give a salutary direction to the latter. This observation is peculiarly applicable to inflammation of the stomach or bowels, to acute dysentery, and to chronic affections also of the digestive canal. I have repeatedly found looseness of the bowels, with griping and some fever, controlled completely by a regimen consisting of rice-water for drink, and of boiled rice or rice-jelly as the chief article of food. A prompt recourse to this diet, the seasoning for which is either sugar with nutmeg or cinnamon, or salt, will, if it do not cure, at least greatly facilitate this result, by removing some of the most serious symptoms. Rice-jelly is made by boiling two ounces of the flour, and a quarter of a pound of loaf sugar, in one pint of water, until it become thick and transparent; it is then to be allowed to cool, and forms a palatable and wholesome aliment. Additional flavour may be given to it by a little rose or orange flower-water. As ground rice or rice-flour is much more apt to be somewhat musty or acquire a foreign flavour than rice in grain, it is well to know that all the preparations desirable for an invalid can be made out of the latter. By slow and careful boiling the rice in

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grain, over a fire not too hot, in a small quantity of water, there will result a homogeneous fluid, white, and of the consistence of cream, which, if put aside to cool, is soon converted into a jelly.

The rice diet here recommended as so useful in the forming stage of disease, if it be taken in place of animal or other stimulating food, is not less beneficial in convalescence from febrile and other maladies. In the summer complaints of children, I know no articles comparable, both as nutritive and medicinal, to rice-water and rice-cream, either sweetened or salted, according to the taste of the sick person. In cases of acidity of stomach and flatulent bowels, salt is the best addition, either to rice or to barley-water, or gruel.

When not forbidden by a feverish or inflammatory state of the system, rice and milk for daily use, is an excellent diet, of the most nourishing kind. The rice should be slowly simmered for three or four hours with the milk until the grains burst, and absorbing the milk, swell up. If the two be now poured out of the saucepan or skillet into a wide dish and put in an oven for half an hour or so, until the surface is slightly browned, sugar having been previously added, there results a plain, wholesome, and nutritive rice pudding.

Maize or Indian corn-meal, though not susceptible of panification alone, makes, in a certain proportion with wheat flour, excellent and wholesome bread, which retains the requisite softness and moisture for thirty-six hours after being baked. In the greater part of America, both North and South, corn-meal is made into cakes of all sizes, and with various other substances combined,—milk, eggs, &c.; also into pudding. The commonest mode of preparing it for bread is simply to

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work it well with water and a little salt, and then to bake it over live coal, or in a pan, or oven.

Mush, made by stirring a certain portion of corn meal in boiling water, until the desired consistence is obtained, is an article of common use, and taken with milk or cream, is both nutritive and agreeable. At first, mush, and even sometimes corn-bread also, slightly acts on the bowels, and hence it is recommended in cases of costiveness; but unless it be taken with molasses we cannot much rely on its operation in this way. Hulled and broken, or half-ground corn, under the name of hominy, is largely used as a vegetable at dinner; it approaches in this state very closely to rice, which it resembles so much in its composition,—maize consisting mainly of starch. In virtue of this proximate principle, Indian corn is converted too often and too largely into ardent spirits by the medium of the still.

Water-gruel, made of Indian corn-meal, has nearly the same virtues, and is used under the same circumstances, as oatmeal gruel or barley-water. It has the disadvantage of which the first of these two is also accused, viz: of causing sometimes heartburn. This effect in both cases, and it is experienced also by many in eating the bread, is owing to the bran which is not entirely separated from the fecula, and which, as in the case of that of barley, is somewhat irritating. A peculiar volatile and somewhat acrid oil resides in the bran or husk of barley.

Buckwheat does not, I believe, enter into the composition of any kind of bread in the United States. Its use is, what the physicians call extemporaneous, for consumption at the time of its being made: it is formed into thin flat cakes with the addition of yeast—a small portion of Indian meal previously mixed with the buckwheat

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flour is an improvement in this case. In different parts of Europe, buckwheat meal is used alone, or mixed with the flour of one or more of the other cerealia in the manufacture of bread. Its starch gives it nutriment, but having little or no gluten, it does not panify or make good leavened bread. In Westphalia and some other parts of Germany, a nourishing but gross bread is made of the flour of barley, rye and buckwheat. I might have mentioned, in its place, that a common kind of bread in Germany is the Lockewitz, which is made by mixing dough made of wheat flour and yeast, with an equal weight of dough made of fine rye flour and leaven, the whole kneaded together, and the dough then divided into small loaves.

The starch which is found to exist in many roots and other parts of shrubs and trees renders these somewhat nutritious, and they have accordingly in times of great scarcity been used for food. In the north of Sweden and of Norway, it is no uncommon thing for the peasantry to mix the inner bark of the pine and larch, previously ground, with rye meal, and convert them after proper kneading into bread. So abundant is the starch in the bark of some of these trees, including also aspens, that it can be extracted from them as from potatoes by trituration with water. (*Liebig*, *Organ. Chem.*, &c., p. 119–120.)*

* As it may diminish the feeling of painful sympathy in the minds of many sensitive persons for the people who use bread such as that just described in the text, I shall here transcribe the directions given by Professor Autenreith, for preparing a palatable and nutritious bread from the *beech* and other woods destitute of turpentine. Everything soluble in water is first removed by frequent maceration and boiling, the wood is then to be reduced to a minute state of division, not merely into fine fibres, but actual powder; and

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Unleavened bread or biscuit is made in very great quantities for consumption both on land and sea, but still more on the latter. It is almost the only kind of bread eaten by the crews of vessels, both of trade and war, and on its suitable preparation out of good flour and its being kept subsequently dry, will depend very much the health of the sailor during a long voyage. With good bread and plenty of good water, dry hammock, and dry clothes to sleep in, he may laugh at scurvy, even though he consume salt meat daily for months. When sea biscuit becomes damp, and is attacked by weevils, it ought to be passed through the oven, by which it regains much of its original freshness and flavour.

Near Portsmouth (England) there is a government manufactory of biscuit, in which the flour having been mixed with the water at the rate of 280 pounds (or a sack) to 13 gallons of water, is effectually stirred with double sets of knives or stones in a minute and a half, and then subjected to back rollers to ensure complete incorporation and kneading. The dough is drawn out and cut by other machinery. The biscuit is baked in a quarter of an hour. In a period of time equal to seventy-

after being repeatedly subjected to heat in an oven, is ground in the usual manner of corn. Wood thus prepared, according to Mr. A., acquires the smell and taste of corn flour. It is, however, never quite white. It agrees with corn flour in not fermenting without the addition of leaven, and in this case some leaven of corn flour is found to answer best. With this it makes a perfectly uniform and spongy bread; and when it is thoroughly baked, and has much crust, it has a much better taste of bread than that which in time of scarcity is prepared from bran and husks of corn. Wood flour, also, boiled in water, forms a thick, tough, trembling jelly, which is very nutritious.

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seven working days of ten hours each, 1,378,400 lbs. of biscuit have been made, in ten ovens, at this establishment.

In making, here at home, the best sea-biscuit or American crackers, the fine stiff dough, on being beaten or rolled out on a dresser with a mallet or roller, is doubled again, rolled or beaten, and the doubling repeated several times, by which means the biscuits split into flakes when broken.

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CHAPTER VII.

VEGETABLE FOOD.

Leguminous Seeds, or Pulse. Their chemical composition,—and highly nutritive properties. The Pea,—its extensive use in Europe and consumption by some of the people of England—Its culture and use in the East—Hindoostan, and in Egypt—The Chick Pea—The Bean, its use in Egypt, Europe, and West Indies—The Kidney Bean,—a native of India—Fricolis largely used in Mexico—Kinds eaten in Africa—Lentils, large use of in Catholic countries,—Potato,—its American origin, extended cultivation in Ireland, Great Britain and other parts of the world—Relative proportion of nutriment in wheat and potatoes—Abundant population where the potato is the staple food—Quantity consumed in Great Britain and in the United States—Sweet Potato—Yam—its mode of cultivation, and preparation for food—Cassava,—its preparation—Largely used for food—Tapioca—Succulent Roots—Turnip—Carrot — Parsnip — Skerret—Beet—Mangel Wurzel—Proximate principles in each of these roots—Salep,—its nutritive properties,—combination with wheat flour—Arrow Root—its varieties and uses—Brazilian arrow root—Sago—its preparation, and extensive use as food—Mosses—nutritive and gelatinous—varieties of and their uses.

The second division of farinaceous seeds is the Leguminous or Podded, which are commonly designated by the term *Pulse*. Next to the cerealia and the potato, they are the most important of esculent vegetables. They are numerous and most universally diffused; and many which are not applicable for human food can still be advantageously used as nourishment for domestic animals. In tropical regions, and on an arid soil, in

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which neither rice nor wheat can be grown, some kind or another of the legumes will thrive and furnish food to the inhabitants. The pulses, which are sown in the rainless parts of India, not only grow themselves, but often, by the moisture which they attract from the atmosphere, aid in preserving millet and other small grain with which they are mixed. The Hindoo sows his small grain in order that he may have a good crop if the season should send him rain, and he at the same time sows pulse, in order that he may not only reap pulse in the event of a drought, but that he may even then, perhaps, obtain with it a little accompanying grain.

Sir Humphrey Davy found that 1000 parts of bean flour yielded 570 parts of nutritive matter, of which 426 are mucilage or starch, 103 gluten and 41 extract.

The Pea, in 1000 parts, gives 574 of nutritive or soluble matter, of which 501 are mucilage or vegeto-animal matter, 22 sugar, 35 gluten; 16 extractive matter remaining insoluble during the operation.

The Kidney Bean, according to Einhoff, yields out of 3840 parts, 1805 parts analogous to starch, 851 of vegeto-animal matter, 799 parts of mucilage.

The flour of the cerealia, on being subjected to maceration in water, always develops acid: the flour of the leguminosæ, in similar circumstances, always manifests an alkali, which is an evidence of their having azote and an approach to animal matter in their composition.

The Pea is one of the most esteemed of the leguminous or pulse plants. It is supposed to be indigenous to the south of Europe, and was cultivated by the Greeks and Romans, the latter of whom probably introduced it into Britain. There are many varieties grown in that country; but the common garden pea,

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(*Pisum sativum,*) and the common gray or field pea, (*Pisum arvense,*) are the most generally cultivated. But since the introduction of drill husbandry, continues Mr. M'Culloch, whose language I am now using, the culture of the pea, as a field crop, has been to a considerable extent superseded by the bean. Sometimes, however, it is drilled along with the latter; for being a climbing plant, it attaches itself to the bean, so as to admit the ground being hoed, at the same time that the free admission of air about its roots promotes its growth. As regards the use of the pea for food in Great Britain, Mr. M'Culloch tells us, that the field pea is now hardly ever manufactured for the purpose of being made into bread, as was formerly the case in many parts of the country; but there is reason to think that the garden pea is now more extensively used than ever. It will be remembered by the reader, that by a computation of Dr. Colquhoun, in 1812, half a million of persons in the United Kingdom lived on peas and beans. We shall not probably be far wrong in believing that about the same number of persons now subsist on these pulse in those countries. Peas are always in constant demand; they are consumed in immense quantities as sea provisions; they are likewise largely supplied to hospitals, infirmaries and workhouses, and are in familiar use in private families. The importation of pulse into Great Britain, in 1831, from foreign countries, amounted to 59,560 quarters, or 476,480 bushels of peas; and 23,388 quarters or 187,104 bushels of beans. The greater proportion of both these legumes came from the north of Europe, and more particularly Russia and Denmark; and still more from Russia and Germany. The Netherlands furnished next to Germany the largest share of

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beans; and the countries as far south as Italy and Malta sent some.

Reference has been already made to the extended culture of leguminous crops in India. The exports of pulse from Calcutta, in 1830, exceeded 1300 tons. In those hot regions with an arid soil, in which travellers are constrained to carry their scanty provisions with them across vast sandy and desert tracts, they gladly supply themselves with small dried substances, which require much mastication and thus stimulate the salivary glands. Under these circumstances, parched chick peas, or leblebby, are in great demand, and are as common in the shops as biscuits in those of England. In Grand Cairo and Damascus, there are many persons who make it their sole business to fry peas, for the supply of those who traverse the desert.

The CHICK PEA (*Cicer arietinum*) was, according to Bellonius, the parched pulse which formed the common provision of the Hebrews when they took the field; and Cassianus supposes it to have been the torrified seed mentioned by Plautus and Aristophanes. The *frictum cicer* seems also to have constituted a part of the usual food of the lower orders at Rome. (*Lib. Entertain. Knowledge.*) The North American Indian, when engaged in war, or unsuccessful chase, will subsist for some time on the parched grain of Indian corn.

The seeds of the kerkedan, a small shrub found growing wild, and sometimes cultivated in the north of Nubia, are made into a kind of bread, and form the principal food of the Kerrarish Arabs; and a decoction of the roasted grains is used as a substitute for coffee. Another shrub, called symka, indigenous to the same country, produces legumes resembling peas, and containing round rose-coloured seeds, which afford excel-

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lent nourishment for camels, and are, when green, employed as human food. These, likewise, as we learn from Burkhardt, the Arabs collect and dry, and by hard boiling obtain from them an oil which they use instead of butter to grease their hair and bodies.

The BEAN (*Vicia faba**) is said to have been first cultivated in Egypt. It is now extended to the eastward as far as China and Japan; and is generally used as an esculent in many parts of Africa; from the northern coast of which, some of the more valuable varieties were transplanted by the Moors into Spain, and by the Portuguese into their own country. When stewed with oil and garlic, beans form, according to Shaw, the principal food of persons of all classes in Barbary.

The bean in its green state is well known as a culinary vegetable. It is often, in Ireland, served up to the labourers, bruised and mixed with mashed potatoes to which butter is added. When mature and dried, it is never used as human food in this country, but is then considered good though coarse nourishment for labouring horses. Campbell, in his Political Survey, published 1774, mentions "that beans are exported for the food of the negroes, in our plantations, and are employed in feeding horses at home; so that altogether they are in daily use, and most certainly turn to a very considerable amount." King stated the annual consumption of beans at that time, to be four millions, and of peas seven millions of bushels. The bean had an indifferent reputation among the ancients. Pythagoras expressly forbade it to his disciples. Columella notices them in his

* In all the subsequent notices of nutritive vegetable substances, the botanical terms refer to the plant or tree.

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time as food for the peasants only: "And herbs they mix with beans for vulgar fare."

The bean, though a coarser plant than the pea, is much more liable than this latter herb to disease and the depredations of insects.

The large variety of beans called 'Windsor Bean,' is the garden bean; it is larger than the field bean. Windsor beans, when fresh, are much used in the season, both alone and mashed and mixed up with potatoes, by the rural population in Ireland.

KIDNEY-BEAN (*Phaseolus*) exhibits two species cultivated in England, and largely in this country, both of them natives of warm climates. The dwarf kidney-bean (*Phaseolus vulgaris*), erroneously called the French bean, is a native of India. The species called the runner (*Phaseolus multiflorus*) comes from South America. In England the immature pod only is used as a legume; but in France and the United States also the ripe seeds, known by the name of haricot or French beans, are prepared in various ways as a favourite edible. It affords a good deal of the Lent food to the inhabitants of Rome, in the shape of haricots, fageoli and caravansas. The large kidney-bean sliced and stewed in milk is a common dish at the farm-houses in Flanders. The leaves of the kidney-bean afford, when boiled, a culinary vegetable, which the Nubians consider an excellent esculent.

Some varieties of kidney-bean are found in cultivation throughout almost every civilized country of the western as well as of the eastern hemisphere. The small black beans called *fricolis*, which are in general demand all over Mexico, are no doubt a kind of kidney-bean. Recent travellers in that country relate that immense fields of these are under cultivation for the supply of the large cities, where they form a part of every meal, and are

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not only much prized by the inhabitants, but also by strangers. Among the productions of Bornou, Major Denham enumerates four kinds of beans, which are raised in great quantities, called *mussaqua*, *marya*, *kleeny*, and *kimmay*. These are eaten by the slaves and the poorer people. A paste compounded of beans and fish was the only eatable the Major and his companions could find in the towns near the river. (*Lib. Entert. Know.*)

Lentil (*Ervum*). The finest variety of lentil is the French. In most parts of the continent of Europe, lentils are cultivated for the use of man, and the seeds are made into soups, or become an ingredient in other culinary preparations. They are readily softened by, and mix with, water, forming with it a potage of a chocolate colour. In Catholic countries, where the formulary of the church enjoins a number of *meagre* days, such plants as the kidney-bean and the lentil are more cultivated than they are in countries where the religion of the people does not prescribe these observances.

Lentils are largely used for food in Upper Egypt.

Potato, (*Solanum Tuberosum.*) It is now pretty generally understood that the potato is indigenous to Chili and Peru, in which countries it grows wild. The plant is very common about Valparaiso, and Mr. Cruickshank says, that he has noticed it along the coast for fifteen leagues to the northward of that port. There is one peculiarity ascribed to the wild plant, by this gentleman, viz. that the flowers are always *pure white*, free from the purple tint so common in the cultivated varieties. Amidst conflicting testimony and opinions on the subject, we must give to Sir Walter Raleigh the credit of introducing the potato. Its introduction by

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him into Ireland in 1610, is well authenticated by corroborative testimony. Among the anecdotes told of this enterprising voyager, it is said that when his gardener at Youghall in the county of Cork, had reared to the full maturity of 'apples' the potatoes which he had received from the knight, as a fine fruit from America, the man brought to his master one of the apples, and asked if that were the fine fruit. Sir Walter having examined it, was, or feigned to be, so dissatisfied, that he ordered the 'weed' to be rooted out. The gardener obeyed, and in rooting out the weeds found a bushel of potatoes.

The discrepancy of opinion respecting the date of the introduction of the potato into Europe, seems to have arisen from confounding the common with the *sweet* potato, (*Convolvulus Battatas.*) The latter was introduced into Europe long before the former, and it seems most probable that it was the species brought from New Grenada by Hawkins.

Potatoes were at first looked upon as a great delicacy, and cultivated by a very few. The Royal Society, in 1663, encouraged a more extensive cultivation of them, as a means of preventing famine. Previously, however, to 1684, they were raised only in the gardens of the nobility and gentry; but in that year, they were planted, for the first time, in the open fields in Lancashire—a county in which they have ever since been very extensively cultivated. Their growth was more rapidly extended in Ireland than in England, and they have long furnished from two-thirds to four-fifths of the entire food of the people of Ireland. Potatoes were not raised in Scotland, except in gardens, till 1728, when they were planted in the open fields by a person of the name of Prentice, a day labourer at Kilsyth.

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Some of the good people in Scotland were opposed, at first, to the new vegetable, declaring that "potatoes are not mentioned in the Bible." Some of the priests in the Ionian islands, at a later period, exponents probably of the prejudices of the people, manifested their hostility by alleging that the potato was the forbidden fruit, the cause of man's fall; and of course its use was both immoral and irreligious. Of a piece with this was the hostility of the French to the growth of the potato in their country, in their voting against a benevolent gentleman who took pains to foster its culture, under the plea that he had invented the potato.

The potato was introduced from England into the Netherlands, and thence into Germany, in the early part of the last century. It was first cultivated in Sweden in 1720, but notwithstanding the exertions and recommendations of Linnæus, it did not come into general cultivation until 1764, when a royal edict was published for the encouragement of this branch of husbandry.

In France, much of the final success of its more extended cultivation, was due to the exertions of the benevolent Parmentier, who persevered amidst open opposition and ridicule of all kinds. For a while, the king, Louis XVI, and his court wore the flower of the potato in the button-holes of their coats, as a means of enlisting popular favour, or, what at that time was equivalent, fashion, on its side. The dearth, in the first years of the French revolution, served to direct attention more and more to the cultivation of the potato, which, after a time, became general. To it were the people of France and some other parts of Europe indebted for protection against famine, in the disastrous years of 1816 and 1817. We might suppose, however, from the following incident, that the prejudices against

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the root were not so great in all parts of France, even at the time in which Parmentier was labouring so hard in its favour. In the seven years war—1756-1763—a small detachment of the French army, while in Saxony, having its supplies wholly cut off, the soldiers subsisted for eight or ten days entirely on potatoes, obtained from the fields; nor was the manner of living considered among them as by any means a hardship. Less than thirty years before this event, the potato was unknown to the agriculturists of Saxony.

About the middle of the last century, the culture of the potato in Switzerland, which was begun in 1730, had so much increased, that it constituted the food of two-thirds of the people. In the present day, it still forms a leading article of food among the peasantry of that country. It likewise makes a very prominent figure in the productive husbandry of Poland, where it is cultivated to an extraordinary extent. In 1827, as much as 4,288,185 kovzecs of potatoes (each kovzec being nearly equal to two hundred weight), were produced in that country. In Italy, within the present century, the cultivation of the potato has been greatly encouraged; and the traveller, in the city of Naples, for instance, must remember the large vessels filled with boiled potatoes, in the public streets, and near the royal palace itself, from which, at a cheap rate, the poor and lazzaroni can procure a wholesome meal—the supply of their favourite maccaroni being deficient or too dear.

The potato was introduced into India some sixty or seventy years ago, and it is now successfully cultivated in Bengal, and has been introduced into the Madras provinces and Java, the Phillipines and China. But in common it does not thrive within the tropics, unless it be grown at an elevation of 3,000 or 4,000 feet above the

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level of the sea, so that it can never come into very general use in those regions. It has been well remarked by Mr. McCulloch: "So rapid an extension of the taste for, and the cultivation of an exotic, has no parallel in the history of industry; it has had, and will continue to have, the most powerful influence on the condition of mankind."

In the United States, potatoes are cultivated to a great extent, and form a regular part of the daily food of a vast majority of the inhabitants. During the year 1840, there were upwards of a hundred millions of bushels raised, of which the state of New York yielded thirty millions, Pennsylvania more than nine millions and a half, Maine upwards of ten millions, Vermont more than eight millions, New Hampshire six millions, Massachusetts five millions, Ohio about the same quantity. From the most northern to the extreme southern limits—from Maine to Louisiana, we find this esculent root largely cultivated. In this country, the potato has its proper rank as an article of food—auxiliary at all times, and in reserve on extra occasions, but not as, in Ireland, the chief subsistence.

From estimates of the proportionate nutritive properties of potatoes and wheat, and the amount per acre of each produced, deductions have been made as to the number of persons that could be supported on an acre of land planted with the former, compared with those that might be supported on an acre sown with wheat.—By some, the proportion is stated to be as high as six to one, and by others as only two to one. Mr. Newenham (on the *Population of Ireland*) states, that three pounds of good mealy potatoes are, undoubtedly, more than an equivalent to one pound of bread. Mr. Arthur Young estimates one pound of wheat to be about equal

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in nutritive power to five pounds of potatoes. According to this gentleman, the average produce of potatoes in Ireland may be taken at eighty-two barrels the Irish acre, which, at twenty stone the barrel, is equal to 22,960 pounds. Mr. McCulloch suggests that *four* pounds of potatoes are equal to *one* pound of wheat; and if we divide, he says, the above product of an acre by four, we have the standard in nutritive power of wheat, as 5,740 pounds. Mr. Young further estimates the average produce of wheat, by the Irish acre, at four quarters or thirty-two bushels; which, supposing the quarter to weigh four hundred and eighty pounds, gives in all 1,920 pounds, or about one-third part of the solid nutriment afforded by an acre of potatoes. Even in Great Britain, the soil of which is better adapted to the growth of wheat, and thought to be less suitable to that of the potato, it admits of demonstration that "an acre of potatoes will feed double the number of individuals that can be fed from an acre of wheat." (*General Report of Scotland*, Vol. I. p. 571, quoted by Mr. McCulloch.) Mr. Jacobs (*Tracts on the Corn Trade*) believes that one acre of wheat will produce sustenance for three persons, and one acre of potatoes will afford it to six and five-sixths.

Another estimate of the proportionate nutritive powers of potatoes and wheat, may be made in the following manner. Supposing the product of an acre of potatoes to weigh nine tons, and that of wheat one ton,—then, taking the estimate of Sir Humphrey Davy as the basis, —as wheat yields 950 parts of nutritive matter in 1,000, and potatoes 230 in 1,000, the quantity of nutritive matter afforded by an acre of potatoes and that by one of wheat, will be nearly as nine to four; so that an acre of pota-

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toes will supply double the quantity of human food afforded by an acre of wheat.

It is clear, therefore, says Mr. McCulloch, that the population of a potato feeding country may become, *other things being about equal,* from two to three times as dense as it would have been had the inhabitants fed wholly on corn. But it is exceedingly doubtful whether an increase of population, brought about by a substitution of potato for wheat, is desirable. Its use as a subordinate or subsidiary species of food, is attended, continues Mr. McCulloch, with the best effects—producing both an increase of comfort and security; but there are certain circumstances inseparable from it, which would seem to oppose the most formidable obstacles to its advantageous use as a prime article of subsistence. Potatoes are a crop that cannot be kept on hand; they are irregular in the amount of produce, more so than wheat; they are not capable, owing to their bulk and weight, and difficulty of preserving them on ship board, of being imported in quantities when the home supply is deficient, or of exporting them when in excess.

It is, therefore, of the utmost consequence to the well-being of every people, and to their protection in years of scarcity, that they should not subsist principally on the potato. In England, the pressure of a scarcity is evaded by resorting to inferior species of food, such as potatoes, and a lower standard of comfort; but if the people were habitually fed on the potato, this would be impracticable. The chances of famine would then be vastly increased, while, owing to the low value of the potato, as compared with most other things, the labourers would have less chance of preserving or acquiring a taste for animal food, or other necessaries and luxuries,

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and consequently of changing their actual condition for a better.

The view which this able writer takes of the question, is, it seems to me, too exclusive, inasmuch as he supposes a choice between wheat and potatoes, or that the latter is only to be used as a last resource. In parts of France, Italy, and other countries in Europe, where the culture of grain was either neglected, or from the nature of the soil and want of capital, impracticable, the growth of the potato has furnished a regular and adequate supply of food to the poorer landholders, and to the peasantry and labourers, which, in former times and under previous arrangements, they did not possess. A more safe course than either reliance on wheat alone or on potatoes alone, is that in which the latter are regarded as constituting the chief bulk of nutriment, the remainder consisting of wheat, or some of the other cerealia. In this way, a country which is unable to furnish grain enough for the support of its people, may, by the cultivation of lands with potato, that are unfitted for grain, give abundant nutriment to all, and also admit of a considerable increase of population without the fear of famine or even dearth. In Ireland itself, the veriest beggar in town or country, receives and uses a portion of oatmeal in addition to the potatoes, which is the staple of his food.

When speaking of the different articles incorporated with wheat flour, in the making of cheap bread, I detailed various processes by French scientific economists, for combining the potato starch with the more valuable and nutritive farina. It may now be added, that forty thousand tons of potatoes are annually manufactured into flour, for the purpose of entering into the composition of bread, within a circle of eight leagues from Paris.

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Various estimates have been made of the entire value of the potatoes annually consumed in Great Britain and Ireland. Dr. Colquhoun, at the end of the late war, made it *sixteen millions* sterling. Mr. McCulloch thinks that it would have been nearer the truth, to estimate the value of the yearly produce of potatoes, in the empire, at *twelve millions*. In France, it has been estimated that the average annual product, in three years, of potatoes and chestnuts, was nearly one hundred and thirty millions of bushels.

In an agricultural as well as hygienic, and even politico-economical view, the cultivation of the potato has this great advantage, that it succeeds well in uplands and lighter soils, and even among the mountains, better, indeed, than in rich and strong lands; and hence an almost unlimited supply of potatoes may be grown, and at small expense, without any diminution of profitable crops of the cerealia, the legumes, or, indeed, of any useful plant or substantial esculent vegetable. A potato has this farther recommendation, of causing an amelioration rather than an exhaustion of the soil.

In the eastern part of Prussia, as stated by Mr. Jacobs, in his Reports, potatoes are applied to many useful purposes. They are cultivated to a great extent, and by converting them into starch and treacle, that land is made to yield a profit which might otherwise have produced a loss. Sugar did not answer so well, but the treacle appeared to Mr. Jacobs to be as sweet as any from the tropics; the only perceptible difference between them was that it had less consistence.

The proximate principles in potato, and a comparison of the amount of these with what is contained in the cerealia, as, also, the proportion of potato which may be advantageously added to wheat flour, in order to make

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a palatable and nutritious bread, are subjects which have been placed before the reader in a former chapter.

Potatoes eaten raw, have been found to be among the best remedies for the scurvy, as well as an excellent preventive.

Among the perverted applications of science, is the conversion of potatoes, by mashing and mixing them with malt, into ardent spirits. One hundred pounds of potatoes contain from sixteen to twenty-two pounds of starch, susceptible of saccharification, and which yield one and two-third gallons, or sixteen pounds of proof spirit.

SWEET POTATO, (*Convolvulus Battatas.*)—This plant, originally from the East Indies, is now most extensively cultivated in America. To the inhabitants of the United States, from New Jersey to the Carolinas, it furnishes a pleasant and nutritious vegetable, resembling in its composition the common potato, but with the addition of saccharine matter, from which it derives its sweetness. So easy is it of cultivation in a climate of a suitable warmth, that many of the savage tribes have introduced it in their lands for their own consumption. In the southern states of the Union, and in the West Indies, sweet potatoes form a no small share of the food of the coloured population.

YAM, (*Dioscorea Sativa.*)—Akin to the potato in its being a tuber, and in its nutritive principles, is the yam. It is the food of the people in the tropical regions, and those in which the potato does not thrive, as in Central America, the South Sea Islands, West Indies, &c. It is a kind of vine growing wild in the island of Ceylon and on the coast of Malabar; and is extensively cultivated in Asia, Africa and America. The root is of a closer texture than the potato, but, like it, is farinaceous. It requires,

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however, to be planted in a richer soil, on the slopes of low hills or the bottoms of valleys.

The *Winged Yam*, (*Dioscorea Alata*,) is another species very generally cultivated; its roots attain to a larger size than the other, being frequently about three feet long, and weighing about thirty pounds. Both kinds are cultivated like the common potato; they are usually planted in August, and are fit for use in the November and December following. When dug out of the earth, the roots are placed in the sun to dry, and are then put into sand or casks, where, if guarded from moisture, they may be preserved a considerable length of time, without being in any way injured in their quality. On this account they are an excellent sea-stock. An acre of ground has been known to produce from twenty to thirty thousand pounds weight.

The root is prepared for food, either by boiling or baking, and in this state it is used by a large population, as a substitute both for bread and other vegetables. The juice of the yam is acrid, and excites an itching when applied to the skin.

Taro, (*Arum Esculentum.*)—This plant, like others of the genus *arum*, possesses both in the foliage and roots acrid qualities, such as those manifested by the cassava, but which, as in the case of this latter, are dissipated by baking or boiling. Thus prepared, it makes with the bread fruit, the chief food of the inhabitants of the Sandwich Islands, and other islands of the Polynesian group. From the root of the *arum maculatum*, or common wake-robin in England, a substance resembling the fecula of arrow-root, and recommended as a substitute of the latter, may be procured.

Cassava, (*Jatropha Manihot*) *Tapioca Plant.*—South America is held to be the native region of this plant,

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which formerly afforded the greatest part of their sustenance to the entire native population of this vast region. In the Mexican states, cassava is more used on the western than on the eastern coast. It needs a dry situation and a good soil for its successful cultivation. Of the nine different species of Jatropha enumerated by botanists, there are but two cultivated for human food, viz., the *Jatrópha Manihot*, or bitter cassava, and the *Jatropha Janipha*, or sweet cassava. The first of these varieties is the more extensively cultivated, although in its natural state, that is before the root has been subjected to a suitable process, it is highly poisonous. The other is wholly innocuous and equally agreeable with the latter, when converted into bread.

When first dug out of the ground, the tubers or roots, which resemble parsnips in appearance, are washed clean; the rind, which is of a dark colour, is then peeled off, and the root is ground or grated. In Brazil, where the preparation of mandioc is carried on to a greater extent than in any other place, many persons are employed together in peeling the roots, which are then applied to and pressed against the face of a wheel that is made to revolve with great velocity; and in this manner they are ground, a trough being placed beneath the wheel to receive the pulp. The next process is that of expressing the poisonous juice, which is effected by placing the pulp in bags, and subjecting it to the action of a press. The only farther operation required to fit it for consumption is that of baking, which is then performed on a hot iron hearth. The pulp being placed on this, forms itself into a very thin cake, similar to a pan cake, and fifteen inches or more in diameter. During the period occupied in this baking, the cake is kept constantly in motion to prevent its being partially burnt, and as soon

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as it is crisp it is removed from the fire: when sufficiently cool it is then quite fit for use. If kept in a dry situation, these cakes will remain good for a very long period. The Indians of Guiana, among whom cassava is the chief bread, have recourse to a process somewhat different from the above, as described by Stedman.

To whatever cause the poisonous quality of the juice of bitter cassava may be owing, it is so highly volatile as to be entirely dissipated by exposure to heat. It is sufficient, for this purpose, to cut the root into small pieces and to expose it during some hours to the direct rays of the sun. Cattle may then be fed on it with perfect safety.

The roots of the sweet cassava are eaten by the Indians after being roasted in hot ashes, and without submitting them to the previous processes of grinding, and expressing the juice. The juice of mandioc is sometimes fermented with the addition of molasses, and converted into an intoxicating liquor, in great favour with the Indians and negroes. This fatal knowledge was possessed by the former when they were first visited by Europeans.

Appropriately enough does cassava follow the potato in this sketch of nutritive vegetable substances; not only on account of both of them being tubers, but also owing to their having a common principle, starch or fecula entering largely into their composition, and on which their nutrimental properties mainly depend.

Tapioca is a kind of starch prepared from the farina of cassava roots, and which with a white milky and poisonous juice makes up their composition. When the pulp is separated from the juice, in the manner already described, and washed, and dried in chimneys exposed to the smoke, and afterwards powdered, it constitutes *Cas-*

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sava powder or *Farine de Manioc.* If it be granulated by agitating it in a heated iron pan until incipient tumefaction, it is called *Couaque* or *Couac.* Lastly, when it is dried or baked into cakes on plates of iron or clay, it constitutes *Cassava* or *Cassada bread.* If the juice which is pressed from the rasped root be allowed to rest, it deposits a fecula: this when washed and dried on hot plates acquires a granular character, and is then termed *Tapioca,* constituting a light and digestible nutriment for children and invalids.

Salep, (*Orchis Muscula.*)—This plant is assiduously cultivated in the East, for the sake of its root, which forms a considerable part of the diet of Turkey, Syria and Persia. Botanists have enumerated many species of this genus of plants, which are fleshy rooted, and from several of which salep may be prepared. Salep comes to us in pieces of an oval form, very hard, approaching to transparency, and of a yellowish white colour. The soil best adapted to the growth of the plant is that which is dry and not very fertile. It is worthy of remark, on this head, that in rich lands, and those which have been highly manured, the *orchidiæ* do not come to maturity. The root is known to be fully matured when the leaves and stalks begin to decay. It has been cultivated in England, and salep procured therefrom.

Among the various methods for the preparation of salep, the following is worthy of being recorded.—The new root is first washed in warm water, when the fine brown skin with which it is covered may easily be rubbed away, by means of a coarse cloth or a brush. The roots being thus cleaned and peeled, are to be arranged on a tin plate and then placed within an oven heated to the same degree as is necessary for baking

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the mixture is removed from the fire when sufficiently dry, it is then ready for use. If kept in a dry situation, these cakes will remain good for a very long period. The Indians of Guiana, among whom cassava is the chief bread, have recourse to a process somewhat different from the above, as described by Stedman.

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bread; here they are to remain from seven to ten minutes, in which time they will exchange their opaque and milky whiteness for a semi-transparent horn-like appearance, and a yellowish colour, retaining their original bulk. Being then withdrawn from the oven, they are exposed during some days to dry and harden in the air; or by the employment of a very gentle heat they may be brought to the same state in the course of a few hours; all that is then required to adapt the salep for food, is to boil it in water to the required consistence.

It has been said that salep contains a greater quantity of nutriment in the same bulk than any other vegetable body; and for this reason it has been proposed, that it should be made to form a part of the provisions of every ship that undertakes a distant voyage. So high a nutritive power has been assigned to salep, that it is asserted, if one ounce of the powdered root, mixed with an equal quantity of stiff animal jelly, known as portable soup, be boiled in two quarts of water, it will suffice for the daily nourishment of an able-bodied man.

A small quantity of salep added to milk, has been found to retard the commencement of the acetous fermentation in this fluid; and Dr. Percival has shown, that if it be used in a moderate proportion, it would prove a very useful and economical addition to wheaten flour in the preparation of bread. He says, that an ounce of salep dissolved in a quart of water, and mixed with two pounds of flour, two ounces of yeast, and eighty grains of salt, produced a remarkably good loaf, weighing three pounds two ounces; while a loaf made of an equal quantity of the other ingredients, without the salep, weighed but two pounds twelve ounces. If, however, the salep be in too large a quantity, its peculiar taste will be distinguishable in the bread. I would

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remark on this statement, that, considering the composition of salep, in its being mainly starch or fecula, a more economical and purer starch could be procured from the potato, or the potato-flour itself might be used, for mixture with wheat-flour, so as to make a wholesome, cheap and palatable bread.

Salep, like tapioca, sago, arrow-root and rice, is a light, simple, and nutritive article of food, peculiarly adapted to invalids and children,—and still more to those whose digestion is readily disordered by the acescency of common vegetable substances, but yet to whom animal food would be too stimulating. Salep, on these accounts, was once high in favour with medical practitioners; but its use has yielded to that of arrow-root, sago, and rice.

Arrow-root, (*Maranta Arundinacea.*)—This plant is a native of South America; but has long been introtroduced into the West Indies, where it forms a pretty important article of cultivation. The root derives its name from its having been supposed, by mistaking it for another plant, (*Alpinia galanga*,) to be an antidote against the poison transmitted by the arrows of the Indians. The *Maranta* has been carried from the West Indies to Ceylon, where it thrives extremely well, and where arrow-root of the finest quality has been manufactured from it.

The nutritive powder, called in the shops *West India* and *Bermuda arrow-root*, is a fecula or nearly pure starch, obtained from the root, as follows: The roots (tubers) when a year old, are dug up, well washed in water, and then beaten in large, deep, wooden mortars to a pulp; this is thrown into a large tub of clean water; the whole is then well stirred, and the fibrous part wrung out by the hands and thrown away; the milky liquor, being passed through a hair sieve or

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coarse cloth, is suffered to settle, and the clear water is drained off; in the bottom of the vessel is a white mass, which is again mixed with clean water, and drained; lastly, the white mass is dried on sheets in the sun, and is pure starch. Dr. Prout regards arrow-root as a low variety of starch, analogous to the low sugar of honey; while wheat-starch, he considers, to be the most perfect form of starch, and analogous to sugar-candy.

Potato-starch, sold in the shops as *English arrow-root*, is said to be sometimes substituted for the Indian arrow-root. The fraud may be easily detected by a good microscope. The particles of potato-starch are distinguishable from those of Indian arrow-root by their larger size, and by the concentric markings on their surface. Pure arrow-root is white, odourless, and tasteless. It is in the form of a light opaque white powder, or of small pulverulent masses. When pressed between the fingers, it feels firm; and when rubbed, produces a slight crackling noise.

In 1835, 3581 cwt., and in 1838, 2538 cwt. of arrow-root were imported into Great Britain.

Brazilian arrow-root is the fecula of the cassava, after being washed, and dried in the air without heat. It is termed also *Moussache*, (from the Spanish *mouchaca*,) or *Cipipa*, and, for some years past, has been imported into France, from Martinique, and sold as arrow-root. An analogous fecula is prepared from the root of the *Curcuma Angustifolia* in Hindostan. The dietetic and, to a certain extent, medicinal properties of arrow-root are the same as those of salep, tapioca, &c. Its nutritive properties are considerable, and if taken with milk, boiled into a jelly, will furnish an abundant sustenance, even to a person who is required to use muscular exercise, if not actually to labour.

Tous les Mois, or *Starch of the Canna Coccinea.*—

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Recently, a fecula under this name has been introduced into the shops. It is prepared, by a tedious and troublesome process, from the root of the above-named plant. It has been recommended as forming a valuable article of food for the invalid; but whether it has any advantages in this respect superior to arrow-root, tapioca, or sago, may well be doubted.

Sago, (*Sagus Farinifera.*)—This variety of the sago plant is a native of Hindostan, and of Malacca, and the Indian Islands. Another, from which also sago is procured, is *Cycas revoluta*, a Chinese and Japanese plant. The first-mentioned is also called *Malay*, or *Rumphius's Sago-palm*.

In many places in the tropical regions where this kind of palm abounds, sago is the general food of the people. In Java, the word *sago* signifies bread. The sago is procured from the farinaceous pith which fills the central tube of the trunk of the tree. The maturity of the latter is known by the transpiration of a kind of whitish dust through the pores of the leaves; and when this appears, the trunk is felled near to the ground. The following is Forrest's description,—of the mode of preparing the pith for use as human food,—in his account of the Molucca Islands: "The tree being felled, it is cut into lengths of five or six feet. A part of the hard wood is then sliced off; and the workman, coming to the pith, cuts across the longitudinal fibres and the pith together, leaving a part at each end uncut, so that when it is excavated there remains a trough, into which the pulp is again put, mixed with water, and beaten with a piece of wood. Then the fibres, separated from the pulp, float at top, and the flour subsides. After being cleared in this manner by several waters, the pulp is put into cylindrical baskets, made of the

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leaves of the tree; and if it is to be kept for some time, these baskets are generally sunk in fresh water to keep it moist. One tree will produce from two to four hundred weight of flour." Mr. Crawford says, "five or six hundred pounds is not an unusual produce for one tree." This is *raw sago-meal*. We seldom or never see sago in Europe but in a granulated state. To bring it into this state, from the flour or meal, it must be first moistened and pressed through a sieve into an iron pot (very shallow) held over a fire, which enables it to assume a globular form. Thus all our grained sago is half-baked, and will keep long. The pulp or powder, of which this is made, will also keep well if preserved from the air, but if exposed it will presently turn sour.

Of late years, the Chinese of Malacca have invented a process, by which they refine sago so as to give it a fine pearly lustre. Sago occurs in commerce in two states, pulverulent and granulated.

With us and in Europe, sago is used chiefly as a diet for invalids, and the sick in febrile diseases, in which a stimulating food would be hazardous, if not positively deleterious. But in the East, as already observed, it forms a no small part of the food of the people in many districts. "The Malay sago-palm," says Dr. Roxburgh, "is the tree, the pith of which is the staff of life to the inhabitants of the Moluccas. Loaves of bread are sometimes made of the sago-flour by these people, which are baked in small ovens, the floors of which are divided, by means of partitions, into cells about the size of an octavo volume."

When the sago-tree is cut down, the vegetative power still remains in the root, which again puts forth its leaves and forms the trunk; and this proceeds once more through its different stages, until it is again sub-

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jected to the axe, and made to yield its alimentary contents for the service of man.

The export of sago to Europe and India is now principally confined to Singapore. The quantity imported into England, in 1838, was 26,988 cwt.; and into France, in 1834, 41,312 pounds.

Mosses.—Different as this tribe of plants is from the cerealia and roots, it furnishes an analogous if not identical nutritive principle common to all of them; viz. fecula or starch. Of the esculent mosses, I shall only mention the Iceland moss, (*Cetraria Islandica;*) the *tripe de roche,* as it is called by the Canadian hunters and guides, (*Gyrophora Proboscidea* and *cylindrica;*) and the reindeer moss, (*Cladonia rangiferina.*)

Iceland moss is used as an edible substance by the Icelanders, who rarely obtain corn bread, and whose limited stock of substitutes obliges them to have recourse to every species of vegetable production which is permitted by their inclement climate to spring forth. The plant is collected by the inhabitants of this northern region, and after being washed, is either cut into pieces, or it is dried by the fire or in the sun, and then put into a bag, which is well beaten; it is ultimately worked into a powder by being trampled on, and in this state is used as food. This lichen is found growing on the mountains, both in the lowlands and highlands of Scotland.

With the alimentary matter there is combined a bitter, on which its alleged curative powers in consumption were supposed to depend. The bitter matter may be extracted by digesting the lichen in a cold weak alkaline solution, (composed of water 300 parts, and carbonate of potassa one part,) and afterwards washing it with cold water. It is then, if required for the use of

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invalids, as a light and digestible aliment, to be boiled in water or milk. When this decoction is sufficiently concentrated it forms a jelly on cooling.

Reindeer moss is a well known example of a nutritive lichen, supporting the animals after whom it is named, when no other subsistence can be obtained.

The *tripe de roche* moss supported Captain Sir John Franklin and his companions, in 1821, for many days; although the bitter principle proved noxious to many of his party.

Carrageen or Irish Moss, (*Chondrus Crispus*,) is one of the *algæ* or seed weeds, which was introduced into medicine a few years ago. It consists, like the lichens above mentioned, of a nutritive jelly, and a bitter principle. As a culinary article, it is employed as a substitute for animal jelly, in the preparation of *blanc mange*, jellies, white soup, &c.

SUCCULENT ROOTS.

The roots which I shall next cursorily speak of are of limited nutritive value. They are the *turnip*, *carrot*, *parsnip*, *skerret*, *beet*, and *mangel wurzel*.

Turnip, (*Brassica rapa*.)—This root was well known to the Romans. Columella recommended that the growth of turnips should be abundant, because those which were not required for human food, could be given with much advantage to cattle; and both Pliny and he concur in their testimony, that this produce was esteemed next to corn in utility and value. The turnip, in some of its varieties, is of very universal culture throughout Europe. In Sweden, it is a very favourite vegetable. The native Laplanders are so fond of this root, that they are often induced to part with a whole cheese in exchange for one single turnip. In Russia,

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as we are informed by Dr. Clarke, "the first nobleman of the empire, when dismissed from attendance upon his person, may be found throughout the day with his neck bare, his beard lengthened, his body wrapped in a sheep's skin, eating raw turnips and drinking quass."

The turnip is a biennial plant. The varieties, both under garden and field culture, are numerous. The root of the French turnip, *naveu*, is of very fine flavour, and in high repute on the continent of Europe. When used, the outer rind is not peeled off as in the common turnip, but merely scraped, since the peculiar taste chiefly resides in that part.

The turnip appears to have been applied to more extensive uses, as an esculent, in former times than at present. It is recorded, that in the years 1629 and 1630, when there was a dearth in England, very good, white, lasting and wholesome bread was made of boiled turnips, deprived of their moisture by pressure, and then kneaded with an equal quantity of wheaten flour, the whole forming what was called turnip bread. The scarcity of grain, in 1693, obliged the poor people of Essex, again to have recourse to this kind of food. This bread could not, it is said, be distinguished by the eye from a wheaten loaf; neither did the smell much betray it, especially when cold.

Turnips should be carefully peeled and well boiled before being brought to table. There is an acrid principle, analogous to that in the radish and in mustard, which resides in the peel of the turnip, and hence the propriety of directing that this be pared off to a sufficient depth. Boiled in milk, or mashed in milk, and all the lumps which are not readily bruised being withdrawn, turnips are a light, and to the sanguine and plethoric, and those of full habit or liable to hemorrhages, a wholesome and

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proper article of food. In such cases bulk, which suitably distends the stomach and obviates the feeling of hunger and sinking, is advantageous, if the quantity of positively nutritive matter be small, and consequently the formation of much blood prevented. The turnip consists chiefly of water, combined with a soluble or nutritive matter in the small proportion of four to six per cent., of which three to five is of saccharine: of starch or analogous mucilage there are seven to nine parts in a thousand. Turnip juice, it is said, after being boiled, coagulates on cooling, and deposits vegetable albumen. Recently expressed, it is colourless, but becomes brown by evaporation, and deposits a few grains of crystallized sugar. According to Drapier, nine per cent. of this substance may be procured from the turnip root. This is too large an estimate in general.

CARROT, (*Daucus Carota.*)—Our ancestors are indebted to the Flemings for the introduction of the carrot into England, in the reign of Queen Elizabeth. This edible root, unlike the turnip, which began to attract notice about the same time, grew quickly into esteem, and being made an object of careful culture, was very shortly naturalized throughout Great Britain. The carrot is a biennial plant. The two chief varieties of carrot are the long and the horn-carrot.

In estimating the dietetic value of the carrot, we must take into the calculation the different proportions, in different varieties and even sizes of the root, between the bark, as it is called, and the wood. The first is of the darkest colour, and of the most pulpy consistence, and it is also sweetest to the taste; the wood or heart, especially when the root has attained its full size, is more fibrous and stringy, and if it be separated from the other outer part, it is bristled over with hard points or fibres, that extend to the rootlets outside. Almost the whole crown of the root, or the part which sends up the leaves, is connected with the wood, and only the skin or epidermis of the leaves and stem with the external part of the root. As the external part, or the bark, is found to be more nutritious than the central part, consequently the value of the carrot, as an esculent, will depend on the relative proportions of these two parts of the root. On occasions in which the carrot is prescribed, or is particularly desired by the invalid himself, as an article of diet in chronic, or convalescence from acute disease, it may be advisable to separate the external portion and retain it exclusively for the use of the patient, after suitable boiling or other modes of preparation, such as stewing.

The remark made respecting the dietetic value of the turnip, applies also to the carrot. It is a light and wholesome vegetable aliment for those whose stomachs are not readily deranged by the saccharine principle. This exists in the carrot in the proportion of nine to ten per cent.; the nutritive or soluble is in about the same ratio, while starch or mucilage is as low as three parts in a thousand. The carrot enjoys a reputation which merits more credit than that claimed for most of the articles similarly praised. It is, of increasing the flow of milk in those mothers who eat of it freely. In Egypt the carrot is esteemed as a pickle.

Parsnip. (*Pastinacea Sativa.*)—The parsnip belongs to the same tribe of plants (*Umbelliferæ*) as the carrot, and in it is also included those of very different properties, such as the deadly hemlock and the gratefully aromatic caraway, sweet fennel, and dill. When the parsnip is grown upon poor land, it loses much of the

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rank taste which it acquires in richer soils, and though not nearly so abundant, it is far more sweet and agreeable. This root is wholesome as well as hardy, and may be used freely under the same circumstances as those indicated in speaking of turnip as an aliment. The dyspeptic who suffers from heartburn and flatulence, and whose circulation is slow and skin cold, will require a drier food, and those kinds in which the saccharine principle is either wanting or in small proportion. These, and the preceding remarks on the turnip and carrot, apply to the invalid and him who is obliged to live by rule. The robust labourer, and he who takes much and active exercise in the open air, requires no counsel in the use of these or of other vegetables, except that it will be prudent, if he eat much flesh meat, to take a larger proportionate allowance of these and other watery vegetables, such as spinach, than would be necessary if his food was chiefly of the farinaceous kind, with little meat.

Parsnips, when slowly roasted in the ashes, become nearly as farinaceous as the best potatoes, and in some of the poorer districts of Great Britain are used with the same additions as an article of substantive food. "In the north of Scotland," Neill observes, "parsnips are often beaten up with potatoes and a little butter; of this excellent mess the children of the peasantry are very fond, and they do not fail to thrive upon it." From the same authority we learn that in the north of Ireland an agreeable beverage is prepared from the roots brewed with hops. In Catholic countries the parsnip is more abundantly employed for human food than in Britain or the United States. The use of it with salt fish in Lent may perhaps be regarded more as the relic of an old

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custom than as a choice arising from any partiality for this particular kind of viand. (*Lib. Entert. Know.*)

The parsnip is, like the carrot, a biennial. It contains about 10 per cent. of nutritive matter, viz: 9 per cent. of saccharine and 9 parts in a thousand of starchy matter. In Thuringia a syrup is prepared from it which is used instead of sugar.

The Skirret, (*Sium Sisarum*,) described by a writer in the seventeenth century as the "sweetest, whitest, and most wholesome of roots," is now seldom grown. The Emperor Tiberius esteemed it so much, that he caused it to be brought from the banks of the Rhine for the use of his table. The luscious sweetness of this root is not adapted to the palates of the present age.

Beet, (*Beta.*)—The root of this plant was known as an esculent in the time of Pliny. The red beet is the variety preferred. When eaten warm, beet-root has rather a mawkish flavour; it is, therefore, usually eaten cold, and cut in slices, after having been previously boiled: with the addition of vinegar it is found by many to be agreeable to the palate. As far as my own observation extends, I should say that beet is the favourite succulent root in the United States. On the score of alimentary properties it ranks next to the potato, having nearly 15 per cent. of nutritive matter, of which 12 per cent. is of saccharine; and, in addition, 13 parts of glutinous or albuminous matter, with 14 of starch in a thousand. Of its dietetic use I have the same opinion as of the roots already mentioned, viz: turnip, carrot, and parsnip. It is less apt, I think, than any of these, to excite heartburn or flatulency in weak stomachs.

Since the beginning of the present century, beet has acquired great importance in a politico-economical view, owing to the large quantity of sugar manufactured from

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its juice. In France particularly, beet-sugar is as pure and good as that from the colonies, and in the market, with the aid of some protecting duties, competes with the latter.

Mangel Wurzel was introduced into France from Germany in the latter part of the last century, under the belief that it would rival the potato both as food for man and beast. By the Abbé de Commerell in France, and Dr. Lettsom in England, great pains were taken to introduce this root to public and popular favour. The Abbé says, when speaking of its general utility, "in years of scarcity, it will afford to men a healthful and agreeable food, and when forage is scarce or dear, will furnish cattle, both in summer and winter, with a cheap and abundant nourishment." The latter is the only part of the prediction which has been fulfilled. The hopes derived from the large proportion of saccharine matter which it contains, that it would yield sugar to the manufacturer as beet has done, have not been realized. The leaves are eaten as a green, boiled like spinach.

The reader will be better able to judge of the relatively nutritive properties of the proceding roots, taking potatoes as the standard, by looking over the following table, which is the result of Sir Humphrey Davy's analysis of 1000 parts of each substance:—

	Whole quantity of soluble or nutritive matter.	Mucilage or Starch.	Saccharine matter.	Gluten or Albumen.
Potato,	260 to 200	200 to 155	20 to 15	30 to 40
Red Beet,	148	14	121	13
Mangel Wurzel,	136	13	119	4
Common Turnip,	42	7	34	1
Swedish Turnip,	64	9	51	2
Carrot,	98	3	95	
Parsnip,	99	9	90	

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CHAPTER VIII.

VEGETABLE FOOD—FRUITS.

Other proximate principles in plants—Acids—Acetic, citric, malic, tartaric, &c.—Extractive matter—Lignin. *Fruits.*—Bread-fruit, the staple aliment in Polynesia—Modes of its preparation—Transplanted to the West Indies—Baobab or murkey bread—its juice highly nutritive. Plantain and Banana—its extreme abundance in Mexico and in the West Indies—its alimentary value—Cocoanut—its many uses. Date—its various dietetic uses—highly prized by the Arabs—Date paste—Arabian Cookery—Anecdote.—Cacao, the basis of Chocolate—its extensive cultivation in Caraccas and Guayaquil—Amount of consumed in Europe—Analysis of cacao kernel—Chesnut—its meal made into bread, in parts of France and Italy—also in Polynesia. Fig—its native country—was much used in Syria and Palestine—is grown in Spain and Portugal, also in Asia Minor—Might be largely in the United States—Dried figs, exported from Smyrna—Figs are grown in England—Caprification—Olive—its oil the nutritive part—Extensive use of—Palm oil —Walnut oil.

Before proceeding with this part of my subject, a notice of fruits used as food, it will be proper to make a few remarks on some proximate vegetable principles not introduced in a former chapter. I contented myself at that time with fixing the reader's attention on those principles, which although proximate were also nutritive, as with these alone we had to deal in a detail of the several vegetable substances used for human food. Now, however, when another division of vegetable products, viz., fruits,

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is about to engage our notice, it will be proper to indicate in addition to their strictly nutritive proximate principles, other elements on which their grateful taste and refreshing and invigorating properties are believed to depend. The chief of these additional elements will be found to be acids of various kinds, combined with more or less extractive matter.

The vegetable acids most commonly met with are the *acetic*, *citric*, *malic*, and *tartaric;* those less so are the *oxalic*, *benzoic*, *succinic* and *gallic*. ACETIC ACID, is that which gives the distinctive and sharp flavour to vinegar. It exists ready formed in the sap of plants, either free or combined with lime or potassa; and is an abundant product of the acetous fermentation. All vegetable substances in which sugar exists, primarily, or developed by art as in the process of malting grain, undergo with water and suitable heat a change called fermentation, by which first alcohol and then acetic acid are formed. In this way we have from the fermentation of the juice of the grape, wine vinegar, which is one variety of acetic acid; from that of malt, beer vinegar, which is a second variety; and from that of sugar, sugar vinegar. The vinegar of cider is analogous to that of wine. Of late years, acetic acid has been procured in large quantities from the destructive distillation in cast iron cylinders, of vegetable substances, such as of oak, ash, birch and beech wood. For a while, the product of this kind of distillation was thought to be a peculiar acid which was named *pyro-ligneous*, and many excellent properties were attributed to it, both in domestic economy and in medicine. But although the chemical notion is erroneous, the applications of the acid are not the less various and useful. It is now known that pyroligneous is the acetic acid contaminated with tar, or

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creasote; and that its conservative effects on meat, &c. are due to these substances conjointly with the acid. Properly purified and diluted with water, the acetic acid from this source makes the best and purest vinegar.

Free acetic acid has been found in the gastric juice; and this fact comes in aid of an opinion deduced from general experience, that a moderate quantity of vinegar with food is a safe and salutary condiment. This remark is not intended however to apply to the absurd and cruel practice on themselves of some who take vinegar in large quantities, with a view of keeping themselves thin or of reducing obesity. Where it acts in this way, it does so as any deleterious agent would do, by impairing if not destroying irrecoverably digestion.

The antiseptic and preservative powers of acetic acid as we find it in common vinegar, are known to every person, and by good housewives are turned to account in various ways, especially in the preparation of pickles. For the most part these articles have little else in their substance than a fibrous and somewhat pulpy matter, possessed of little taste and still less nutritive properties; being commonly fruits or vegetables gathered in their crude state, and serving little other purpose than to absorb and retain the acid on which their flavour and their effects good or bad mainly depend. If taken in any quantity, the vegetable substance will offend a weak stomach by remaining in it for a length of time unchanged.

Citric acid, derives its name from its abundance in, and being most commonly procured from, the fruit of the genus *Citrus*, represented by the lemon, lime and orange, &c. It is also the chief and almost the only acid in the fruits of Dulcamara, dog-rose, cranberry, bird

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cherry and whortleberry. Mixed with an equal quantity of malic acid it is found in the gooseberry, red currant, strawberry, raspberry, cherry, &c. In the tamarind it exists both with malic and tartaric acids. In nature, citric acid is met with most abundantly in lemon juice; but even here it is in less proportion than would be detected by the taste, viz. not quite 2 per cent.—water being 97, and exceedingly minute proportions of malic acid, gum and bitter extractive, in all less than 1 per cent., making up the remainder. The juice of lemons and limes is imported for citric acid manufacturers, in pipes and hogsheads. Farther particulars respecting this acid and its hygiènic uses, will be found under the head of 'Lemon,' in the following chapter.

Malic acid is named after the apple (*malum*) in which it prevails. It has also been called *Sorbic*, from the *Sorbus acuparia*, or mountain ash or service tree, the berries of which supply it in the greatest abundance. The sorbic was at first thought to be a distinct acid, but it is now ascertained to be identical with the malic. The pleasant acidity in the apple and in cider is derived from this acid, which is also met with in grapes, in conjunction with the tartaric acid, and in currants, gooseberries, and oranges, together with the citric acid; it is also present in the quince and pear.

Tartaric acid, so dominant in cream of tartar, exists in its free state in grapes, tamarinds, and the pine-apple, and likewise in pepper. It is found in combination with an alkali (potassa) in a state equivalent to cream of tartar, in tamarinds, grapes, mulberries, &c., and with lime in a variety of the sumach (*Rhus typhinum*). In small quantities freely diluted with water, tartaric acid forms a refreshing and cooling drink, which allays thirst after exercise, or the more craving kind in fever. Drunk with

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any freedom it is a mild aperient, and may be had recourse to in slighter cases of febrile disease with good effect. It might be used as a cheap substitute for citric acid or lemon juice. In general it is procured in sufficient strength and with an increase of its medicinal powers in its state of combination with potassa, in the common saline preparation,—*cream of tartar.* It ought to be known, however, that the continued use of this acid, or of the salt just mentioned, disturbs digestion, and produces other secondary unpleasant effects. The common sodaic powders are made by adding bicarbonate of soda to tartaric acid, in the proportions of half a drachm (30 grains) of the former, in a blue paper, and 25 grains of the tartaric acid, in a white paper. Before use, they should be dissolved, each in a quarter of a pint of water, and then the one added to the other.

Of the other vegetable acids, my notice will be quite brief. *Oxalic acid* is found in both common and wood sorrel. It is one of the most powerful and rapidly fatal poisons which we possess, and frequently accidents have occurred from its being mistaken and sold for Epsom salt, with the appearance of which its crystals have some resemblance. These substances may, however, be readily distinguishable; the oxalic acid, for it may be tasted without danger, having a strong acidity, while the Epsom salt has a bitter saline taste.

The *benzoic* and *succinic* acids are not proximate principles in any article of food or in fruits, but as belonging to medicines need no farther mention here. *Tannic acid* has also chiefly a medicinal application, as far as regards its effects in the animal economy; it has until recently been called *tannin*, and is usually spoken of as the astringent principle in certain medicines. It is occasionally found in the skin of fruits, as in that of

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grapes, and is one of the elements detected in certain wines,—whence they derive their astringency. It also exists in the quince and probably in the pomegranate.

Extractive matter, a familiar title in vegetable or organic chemistry, does not, however, convey a very definite meaning, at least of specific or peculiar properties. When vegetable juices are evaporated by a gentle heat in the air, a brown or brownish-black substance is precipitated as a product of the action of oxygen upon them. This substance, which appears to possess similar properties, from whatever juice obtained, has received the name of *extractive* matter; it is insoluble or very sparingly soluble in water, but is dissolved with facility by alkalies. (*Liebig. Organ. Chem.*) By writers on Materia Medica, a different and more precise idea has been attempted to be conveyed in their use of the term extractive matter; they suppose it is that to which vegetable tonics owe their bitterness and medicinal activity. But this opinion is not based on fact, for the bitter in different vegetable substances is connected with a different base: as with strychnia in nux vomica, quinia in Peruvian bark, morphia in opium, &c. To recur to the first definition of extractive matter; we may generally believe it to exist in pulpy fruits, and probably to contribute somewhat to their nutritive properties.

Lignin is another and the last vegetable principle which I shall notice in connection with the present subject. It constitutes the hard fibrous structure of plants, and is the basis of, and indeed makes up nearly the entire substance of wood, which contains 96 per cent. of lignin. In a more attenuated and delicately reticulated state it exists in some esculent roots, as in the potato, and in a few fruits. It conveys no nutriment, although

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it is convertible into sugar by mixture and boiling with sulphuric acid.

FRUITS.

In speaking of fruits, in this chapter, I shall confine myself chiefly to those which are possessed of nutritive properties, and some of which contribute mainly to the support of the people in the regions where they grow. They are, therefore, entitled to notice as illustrative of national regimen. The most important are the bread-fruit, the plantain and banana, the cocoa-nut, the chest-nut, the date, the cacao and the fig.

The Bread-fruit is the product of a tree, (*Artocarpus incisa,*) a native of the islands of the Pacific and the Moluccas. It is to the inhabitants of Polynesia what bread-grain is to the people of other parts of the world. They are fond of it, and it evidently suits their constitutions, as a very perceptible improvement is often witnessed in their appearance a few weeks after the bread-fruit season has commenced. For the chiefs it is usually dressed three times a day, but the poorer classes seldom cook it more than once a day, and even rebake it on the next. Sometimes the natives of a district assemble to prepare it in a large and common oven, when it is called opio. This is done by digging a large pit, twenty or thirty feet round, and filling it with fire-wood and large stones, till the heat almost brings the latter to a state of liquefication, when the covering is removed, and many hundred of ripe bread-fruit thrown in, with a few leaves laid over them; the remaining hot stones are placed above them, and the whole covered with leaves and earth. It remains in this state a day or two, when the parties to whom the fruit belongs dig a hole, and take out what they want, till the whole is consumed. Bread-fruit thus baked will keep good for several weeks after the oven is opened. This process is much discontinued since the introduction of Christianity, owing to the debauchery, rioting, feasting and sleeping, which used to follow the opening of an opio oven.

Sometimes the fruit undergoes fermentation, by being piled in heaps, and beaten to a kind of paste, when it is called *mahi*. It keeps many months, and though sour and indigestible, is considered good food during the scarce seasons. The tree on which the bread-fruit grows, besides producing three or four regular crops annually, and seldom being quite destitute of ripe fruit, furnishes a valuable resin, that is used for making tight the seams of the canoes. There are fifty varieties of this tree.

In the Sandwich Islands, the bread-fruit is usually eaten green, when its rind is thin, but hard, like that of a melon, and entirely covered with slightly marked and small pentagonal sections. It is cooked by throwing it immediately in the fire, when the outer coat becomes charred and the inner coats only roast, like the potato, which it resembles in general consistency, though it is rather more spongy, and the whole, when the rind is removed, has the appearance of a beautiful light coloured smoking loaf. The taste is like the hard-boiled yolk of an egg, slightly astringent. (*Murray's Encyclopædia of Geography*, Vol. III. *Am. Edit.*)

Captain Cook, in speaking of the utility and productiveness of the bread-fruit, says, that if, in those parts where it is not spontaneously produced, a man plant but ten trees in his whole life-time, he will as completely fulfil his duty to his own and to future generations, as the native of our less temperate climate can do by ploughing in the cold of winter, and reaping in the summer's heat, as often as these seasons return, even if, after he has procured bread for his present household, he should convert the surplus into money, and lay it up for his children.

Towards the conclusion of the last century, the bread-fruit tree was transplanted to Jamaica, whence it was transferred to other islands, in which it has thriven and become abundant; but the negroes continue to prefer the plantain.

The tree is propagated by shoots from the root: it bears in about five years, and will probably continue bearing for fifty. The fruit is something like a roundish or oval melon, with hexagonal marks, and six or eight inches in diameter.

Baobab or Monkey Bread, the fruit of the *Adansonia digitata*, is one of the most valuable productions of Western Africa: it is likewise said to be found in Egypt and Abyssinia. The baobab is the largest known tree. The fruit is acid and agreeable, and the juice expressed from it, mixed with sugar, forms a drink highly prized in low fevers. Bowdich mentions that it possesses such an agreeable odour, and is so abundant, that it constitutes a principal article of food with the natives, who season many of their dishes with it. It forms an article of commerce, and reaches Morocco and Egypt.

Banana and Plantain, (*Musa Paradisiaca* and *Musa Sapientium*,) varieties of the same herbaceous plant, constitute the food of a large portion of the people of Mexico and the West Indies, and the islands of the Pacific. Humboldt, in his *Personal Narrative*, says: "It is to be doubted whether there is another plant in the world, which, on so small a space of ground, produces such a mass of nourishing substance. In eight

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or nine months after the sucker is planted, the banana begins to show its flowery stem, and the fruit may be gathered in the tenth or eleventh month. When the stalk is cut down, one among the many shoots is always found, which is about two-thirds as high as the parent plant, and will bear fruit three months later. Thus a banana ground is kept up without any farther trouble than that of cutting down the stem of which the fruit has ripened, and stirring the ground a little, once or twice a year, about the roots. In one year, a space of a hundred square inches, containing thirty or forty banana plants, gives upwards of 2,000 kilogrammes, or 4,000 pounds weight of nourishing substance. What a difference between this produce and the grain that is yielded by the most fertile parts of Europe! Calculations prove that the amount of nourishing substance obtained from a banana ground, is as 133 to 1, when compared with the growth of wheat on the same space, and as 41 to 1 of potatoes."

In America and the West Indies, numerous preparations are made of this fruit, both before and after its maturity. When fully ripe, it is exposed to the sun, and preserved like figs: the skin becomes black, and exhales a peculiar odour like that of smoked ham. This dry banana, (*Platana possada*,) which is an object of commerce in the province of Mechoacan, has an agreeable taste, and is a very wholesome article of food. Meal or flour is obtained from it by being cut into slices, dried in the sun, and pounded. Humboldt says, that he has often seen the natives, after a day of great fatigue, make their dinner on a very small quantity of manioc, (cassava,) and three bananas of the larger kind. "Generally speaking," he adds, "in hot countries, the people are partial to saccharine food, which they consider not only

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palatable, but highly nourishing. The muleteers, on the coast of Caraccas, who conveyed our baggage, frequently preferred raw sugar for their dinner to fresh meat."

In the West Indies, the "Plantain Walk" is a necessary part of every estate, for the supply of bananas to the negroes, particularly the younger ones. But for plantains, says Dr. Wright, Jamaica would be scarcely habitable, as no species of provision could supply their place. Even flour, or bread itself, would be less agreeable and less able to support the laborious negro, so as to enable him to do his business, or to keep in health. But it is in Mexico, more particularly, that banana forms a principal part of the food of the people; and the apathy or indolence of the natives of the *tierras calientes*, or hot regions, has been ascribed, and probably with good reason, to the facility with which this fruit supplies them with subsistence.

Cocoa Nut, (*Cocos Nucifera.*) The tree which bears this fruit belongs to the palm tribe, and is deservedly valued as one of the greatest of the many blessings showered down, by a bountiful Providence, upon the inhabitants of a tropical climate. It is a common saying, that the cocoa-nut tree has ninety-nine uses, and that the hundredth cannot be discovered: but the Hindoos have gone far beyond this, in their celebrating three hundred and sixty-five uses which they derive from it. This palm is from sixty to a hundred feet in height, and one to two feet in diameter; at the top it is crowned with a magnificent tuft of leaves, each about fourteen feet in length, and resembling an enormous feather or plume, which waves over the spreading wood or the humble shrubbery. Unlike the bread-fruit, plantain and almost every tree affording valuable fruit which

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require a fertile soil to bring them to perfection, the cocoa-nut, though it will grow in rich valleys, and beside the streams that flow through them, yet flourishes equally on the barren sea-beach and fragments of coral and sand, or lagoon islands, where its roots are washed by every tide, and on the arid sides of sunburnt mountains, where the soil is shallow, and where no stream is seen to flow.

It is a very prolific tree; flowers are put forth every four or five weeks, and thus flowers and fruit are generally to be seen at the same time;—and in every stage, from its first formation after the fall of the blossom, to the hard, dry and ripe nut, that has almost begun to germinate, the fruit may be seen at the same time on the same tree; and, in one way or other, its pulp, milk, kernel, husk or oil, are all rendered subservient to the wants of the people in whose countries it grows. While the nut is green, the whole hollow of the shell is filled with fluid, which is refreshing, agreeable and pleasant to the taste. The solid part of the ripe kernel is extremely nutritious, but rather indigestible. A tree generally yields about one hundred nuts, in clusters near the top, of about a dozen each. Multiplied and various are the uses to which the other parts of the tree are put,—as baskets from its roots, cables and ropes from the fibrous covering of the nut, covering for houses, fences and torches from its leaves, pipes for aqueducts out of the hollowed trunk, &c. The terminal bud is accounted a delicacy for the table,—the leaves are the chief diet of the tame elephant in Ceylon. A vast quantity of oil is pressed from the kernel, the excellent quality and commercial value of which are well known. A coarse sugar, also, called jaggery, is prepared from the juice of the cocoa-nut tree.

Date.—The fruit of the date palm, (*Phœnix dactylifera,*) is a gift of Providence to the inhabitants of many

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countries, more prized and less abused than that of the vine in more favoured regions. The zone of the date is intermediate between the temperate and the tropical; it is one in which the cerealia either do not grow at all, or very scantily, and that runs parallel to the mighty desert which extends, with but few interruptions, from the Atlantic ocean to Persia and Upper India, in a range of four thousand miles. This tree winds along the course of the Euphrates and the Tigris. On the north, it advances to Tekind (lat. 34° 40′ N.), in the west, it casts its shadow over the ruins of Palmyra, and penetrates Palestine and Syria as far as the plains of the Mediterranean. It does not grow, at any rate luxuriantly, north of Smyrna. The date palm is so abundant, and so unlike any thing that can be considered as a tree, in the country between the states of Barbary and the desert, that this region is designated as the land of dates, (*Biledulgerid.*) On account of its evergreen foliage, it has been considered by the Psalmist as an apt emblem of the flourishing and happy state of the righteous, who "shall flourish as a palm tree."

This fruit is in general use in northern Africa, Syria, Annatolia, Arabia and Persia, both in its fresh and dried state; and it serves as well for nourishment as for drink. Milton has expressed this, when he says,

> Fruits of the palm tree, pleasantest to thirst
> And hunger both.

In Arabia, the harvest of dates is expected with as general a rejoicing as the vintage in the south of Europe. The crop sometimes fails, or is destroyed by locusts, and then a universal gloom overspreads the population. The people do not depend upon the new fruit alone, but during the ten months of the year, when no ripe dates

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can be procured, their principal subsistence is the date paste, called *adjoue*, which is prepared by forcibly pressing the fruit, when fully matured, into large baskets, each containing about 2 cwt. "What is the price of dates at Mecca or Medina?" is always the first question asked by a Bedouin, who meets a traveller on the road or in the desert. Dates dried in the sun, upon mats, are largely used in the east. Travellers often carry with them a little bag of dried dates, as their only or chief subsistence, during journeys of many hundred miles. The *adjoue* or date paste forms, says Burkhardt, the daily food of all classes of people: in travelling, it is dissolved in water, and thus forms a sweet and refreshing drink. All the refinements of Arabian cookery are exhausted in the preparation of dates, and the Arabs say, that a good housewife will daily supply her lord for a month with a dish of dates differently dressed. Bread and dates, with water as a drink, constitute almost the entire food of the dervishes. The practice in this respect, of these wandering Mohammedan monks, might serve as a salutary hint to many an expounder of Sacred Writ, to substitute water for stronger drinks, and to let vegetable predominate largely over animal food, in his daily diet.

The cultivation of the date tree is an object of the highest importance in the countries of the east. In the interior of Barbary, in great part of Egypt, in the more dry districts of Syria, and in Arabia, it is almost the sole object of agriculture. In the valleys of the Hedjaz, there are more than a hundred kinds of dates, each of which is peculiar to a district, and has its own (alleged) peculiar virtues. Date trees pass from one person to another in the course of trade, and are sold by the single

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tree; and the price paid to a girl's father on giving her in marriage often consists of date trees.

A pleasant anecdote was related to Sir John Malcolm, which will serve to illustrate the indispensable character of this tree in the eyes of the Arabs, to whom indeed it seems to occupy much the same place in the vegetable kingdom, as the camel does in the animal; and to be in an equal, perhaps a superior degree, a bountiful provision of nature for their wants, and the peculiar physical circumstances of the country they inhabit. The story runs thus: "Some time since an Arab woman, a native of Abu-sheher, went to England with the children of a Mr. Beauman. She remained in your country four years. When she returned, all gathered round her to gratify their curiosity about England. 'What did you find there? Is it a fine country? Are the people rich? Are they happy?' She answered, 'The country was like a garden; the people were rich, had fine clothes, fine houses, fine horses, fine carriages, and were said to be very wise and happy.' The audience were filled with envy of the English, and a gloom spread over them which showed discontent at their own condition. They were departing with this sentiment, when the woman happened to say, 'England certainly wants one thing.' 'What is that?' said the Arabs eagerly. 'There is not a single date tree in the whole country!' 'Are you sure?' was the general exclamation. 'Positive!' said the old nurse: 'I looked for nothing else all the time I was there, but I looked in vain.' This information produced an instantaneous change of feeling among the Arabs; it was pity, not envy, that now filled their breasts, and they went away wondering how men could live in a country where there were no date trees."

There is hardly any part of the date tree which is not

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serviceable to man, either as a necessary or a luxury. When the fruit is completely ripened, it yields, by strong pressure, a delicious syrup, which serves for preserving dates and other fruits, or the fruit may be made into jellies and tarts. Perverse ingenuity has succeeded in procuring by distillation from the date and also from the juice of the tree itself, an ardent spirit, the arrack or *rackee* of the east.

CACAO, (*Theobroma Cacao.*)—The pulp of the cacao is the basis of chocolate; and hence the name of *chocolate-nut* given to the fruit of the tree. The cacao-tree, both in size and shape, resembles a young cherry-tree, but separates, near the ground, into four or five stems. It is found wild in the woods, in the Upper Orinoco, and is largely cultivated in Caraccas and Guayaquil, and, but to less extent, in the West Indies. The plantations of it are usually found in low and swampy places, the cacao trees being protected from the intense heat of the sun by larger trees, which are planted over them. It suffers, as we learn from Humboldt, from the north-easterly winds; and the heavy showers that fall during the winter season, from December to March, are very injurious to it. The cacao harvest is very uncertain; and the causes of failure are increased by the depredations of worms, insects, birds and quadrupeds. This branch of agriculture has, moreover, the disadvantage of obliging the new planter to wait eight or ten years for the fruits of his labours, and of yielding an article of very difficult preservation; but it requires a much less number of labourers than most others, one person being sufficient for a thousand trees, which, on an average, yield twelve fanegas, or more than eighteen bushels, annually.

The nuts are contained in pods, much like a cucum-

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ber, that proceed immediately from all parts of the body and larger branches; each pod contains from twenty to thirty nuts, of the size of large almonds, very compactly set. The nuts should be chosen full, plump, and shining, without any mustiness, and not worm-eaten. They yield a great deal of oil; but in addition to the use made of them for food by a certain portion of the inhabitants, and in the shape of the excellent beverage cacao, they are largely employed in the manufacture of chocolate, of which they form the principal ingredient. The finest cacao is said to be that of Sicomusca. The principal exportations, however, are from the Caraccas and Guayaquil, particularly the former. M. Humboldt estimated the consumption of cacao in Europe, in 1806, at 23,000,000 lbs., of which six to nine millions were supposed to be consumed in Spain. The *husks* or *shells* of the nut are used largely by dietetic invalids, whose digestion is so apt to be disturbed by the oil of the nut itself.

The following analysis of the cacao kernel will explain why chocolate, even if there was no fat or butter added to the cacao in its preparation, disagrees with stomachs of considerable powers of digestion: Fat or oil, 53 per cent.; 17 albuminous brown matter, containing the aroma of the bean; 11 of starch; 8 of gum or mucilage. The husks yield 12 per cent. of the weight of the bean; they contain no fat, but have lignin and mucilaginous extract.

Chestnut, (*Castanea vesca.*)—Of the edible and nutritive fruits, the chestnut is entitled to a high rank. Chestnuts form, in some parts of Europe, a large proportion of the food of the inhabitants, with whom they are consequently a substitute for bread. This is particularly the case in the Limousin (France), in Corsica,

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and in several districts of Spain and Italy. In the last named country, particularly in the region of the Appenines, the people make a bread (*polenta*) out of the meal of the chestnuts, either alone or mixed with the meal or flour of some of the cerealia. Chestnut-meal consists mainly of fecula or starch and sugar. The chestnut is supposed, by some, to be the acorn mentioned by the ancient writers, as the earliest food of men in their savage state.

In certain seasons of the year, when the bread-fruit is scarce, the natives of the South Sea Islands (Polynesia) supply the deficiency with the fruit of the Mape, or Ruta, a native chestnut (*Inocarpus edulis*). The nuts hang in clusters, covered with a thin husk; they are generally pulled when green, and eaten roasted.

Fig, (*Ficus Carica.*)—The fig-tree, Mr. Phillips properly observes, is evidently a native of that part of Asia where the garden of Eden is generally said to have been situated, as it is the only tree particularly named in those passages of the Bible which relate to the creation and fall of man. "And they sewed fig-leaves together, and made themselves aprons." It grows wild, in common with the vine, the peach, the almond, the medlar, the apricot, the cherry, the plum, the quince, the apple and the pear, in that prolific region of western Asia, between the range of highlands overlooking the Mediterranean on the west, and the Gulf of Persia and Caspian Sea to the east, and between the Black Sea to the north, and the deserts of Syria to the south, watered by the Tigris and Euphrates.

The fig-tree is often mentioned, both in the Old and New Testament, in a manner to induce us to conclude that its fruit formed a principal part of the food of the Syrian nation. In the twenty-fifth chapter of

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the first book of Samuel, we read, that when Abigail went to meet David, to appease him for the affront given by Nabal her husband, she took with her, amongst other provisions, a present of two hundred cakes of figs.

In Sparta, the monthly contributions of each man to the common table, as prescribed by Lycurgus, was "one bushel of flour, eight measures of wine, five pounds of cheese, and *two pounds and a half of figs.*" The Athenians were particularly choice in their figs, the exportation of which from Attica was forbidden. The fig was a fruit much admired by the Romans, who brought it from most of the countries they conquered, and had so increased the varieties in Italy, by the time of the Christian era, that Pliny has furnished us with a description of twenty-nine sorts that were familiar to him. He says, in praise of this fruit: "Figs are restorative, and the best food that can be taken by those who are brought low by sickness, and are on the recovery." He adds, "that figs increase the strength of young people, preserve the elderly in better health, and make them look younger and with fewer wrinkles. They are so nutritive as to cause corpulency and strength; for this cause," continues he, "professed wrestlers and champions were, in times past, fed with figs." But it must be remembered, that these praises are due to the fig recently gathered, and not in the state in which it is brought to us after being dried. In the fresh state, this fruit is both agreeable to the palate and wholesome; when dried, as we receive them, figs not unfrequently disorder the stomach and bowels, and occasion flatulence and looseness. They are well adapted to obviate constipation.

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The fig-tree abounds in Palestine; it existed there, we know, before the entrance of the Israelites, for, besides the branch with one cluster of grapes, borne between two upon a staff, and brought by the men who were sent by Moses from Paran to spy out the land of Canaan, there were "figs and pomegranates." Josephus tells us, that they have figs for ten months in the year; and it is certain, that two or three crops are gathered annually. In southern Italy, they are of a fine flavour, as travellers at this time to Rome can testify. In Spain and Portugal, this fruit is also extensively cultivated, and particularly in the province of the Algarves. They are thrown in heaps, after being gathered, in a building prepared for the purpose, where a syrup flows from them which is used in making brandy. They are then spread to dry in the sun, in an open situation, where they are left for a few days, in proportion to the heat of the weather; after which they are packed in small baskets, made of the leaves of the fan-palm, and exported. In the south of France, they are prepared by dipping them in scalding-hot lye, made of the ashes of the fig-tree, and are then dried in the sun. But by far the largest quantity of figs is exported from Smyrna, where they are brought from the interior. Of 20,406 cwt. of figs imported into England, in 1830, no less than 18,801 cwt. came from Turkey. The quantity brought into the United States, in 1840, was valued at 102,000 dollars.

Figs, with proper care, might be abundantly raised in various parts of the United States, as they, to a limited extent, are in some. The fig-tree was first planted in England about the middle of the sixteenth century (1548): it grows well in the southern counties, and produces good fruit. "There is an orchard of fig-

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trees at Tarring, near Worthing, in Sussex, where the fruit grows on standard trees, and ripens as well as in any part of Spain. These trees are so regularly productive as to form the principal support of a large family. Although the orchard does not exceed three-quarters of an acre, there are upwards of one hundred trees, that are about the size of large apple-trees, the branches extending near twenty feet each way from the trunk." Mr. Loud, the proprietor of this little fig orchard, informed Mr. Phillips, that he gathers about 100 dozen per day during the season, and that he averages the trees to produce him about 20 dozen each: the fruit ripens in August, September and October, a part of the year when the neighbouring watering-places are frequented with fashionable company, that insures a ready sale for this agreeable fruit. The second crop has occasionally ripened; the fruit, although much smaller, is exceedingly sweet. Two of the trees are (1821) about seventy-five years old.

To render the fig more certain of ripening, the process of caprification has been employed; the theory of which it is unnecessary to explain here. It must suffice to say, that what we commonly regard as the fruit of the fig is no fruit at all, any more than the substance which is eaten of the common artichoke. To the fig, which is originally a fleshy receptacle containing many, and often only barren flowers, a little insect resembling a gnat, a species of *Cynips*, brings from the wild fig,—which it has visited, and from which it comes loaded, a farina necessary to fertilization. Others, as Mr. Link, maintain that the puncture of the young fig, caused by the insect, gives a fresh stimulus and a new movement to the sap or juices of the fruit, thereby not only preventing the fall of the fruit, but rendering it sweeter and better flavoured; and it is certain that many of our common fruits, when pierced by insects, acquire the sweetest flavour.*

Olive, (*Oliva Europæa.*)—The fruit of the olive-tree has little to recommend it as an article of food; and as a condiment, it does not now properly come before us; but by the oil which is expressed from them, olives assume importance as an article of national regimen. The olive-tree is cultivated with most success in the south of France and in Spain and Italy. The olive is indigenous to Syria, Greece, and Africa, and in the lower slopes of Mount Atlas. Olive-oil is much used by the people, particularly the rural population and labourers in cities, in southern Europe, as an article of food, commonly added to lettuce or some other salad, and eaten with bread. Its nutritive properties are admitted. To northern countries, it is largely exported, both as a condiment with fish and meats, and as an article used in manufactures. Olive-oil is the chief export from the kingdom of Naples.

The veneration of the Athenians for the olive, as the tree of Minerva, is known to most readers; and the estimation in which they held the oil, as well as its abundance, by which they supplied their own wants and sent it abroad in exchange for other commodities, are also familiar facts to the classical student. Among both Greeks and Romans, inunction with oil was a constant accompaniment of the bath.

Olive-oil is produced in great quantity, and of good quality, in the province of Suse, empire of Morocco.

* Murray's Encyclopædia of Geography, Vol. I. p. 565: Amer. Edit.—a work which, compared with its precursors, merits the strongest commendation.

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In 1832, 5000 tuns of olive-oil were imported into Great Britain; the amount in 1830 had been as high as 8524 tuns,—the tun being 4 hogsheads, or 252 wine gallons. The exportation into the United States, in 1840, was estimated at 96,000 dollars.

PALM-OIL is obtained, by expression, from the fruit of the *Elais Guineensis*, a species of palm. It has a sweetish taste, and an agreeable odour, somewhat similar to that of orris-root. Palm-oil is used by the natives of Guinea and of Central Africa as a butter, with rice, yams, &c. Its ordinary use in England, is in the manufacture of yellow soap.

There is another *palm-oil*, analogous to the preceding in its properties, which is procured from the fruit of the *Cocos butyracea*, a native of South America.

WALNUT-OIL.—The oil expressed from the walnut (*Juglans regia*) is procured in some countries, as in Savoy and Piedmont, in sufficient abundance to be used in the place of olive-oil.

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CHAPTER IX.

SUGAR—GRAPES.

Sugar—Sugar-cane, its extension westward—Manufacture of sugar—Raw and refined sugar—Sugar from beet-root—from the sugar-maple—Quantity of sugar in the markets of the world—General use of sugar—Its alimentary value—Honey—Its qualities—Reputation in ancient times—Biblical references to it—Grapes—Extent of cultivation of the vine—France chief vine-growing country—Quantity of wine made in France and consumed by the people—Condition of the people in the vine districts—Use of grapes as aliment and for refreshment—Abundance and size of grapes in Palestine and Upper India—Grapes in England and the United States.

Before I proceed any farther with a description of fruits, I shall speak of a substance which enters largely into their composition, and which is therefore so closely related to them—I mean sugar.

Sugar (*Saccharum Officinarum.*)—The cane, from the juice of which sugar is procured, belongs to the great natural family of grasses that contain the cerealia. But this substance, as we have already seen, is found in most vegetable matters which contribute to the food of man. It is the element by which both panary and vinous fermentation is brought about, and it plays an important part in nearly all chemical changes, in organic bodies from the vegetable kingdom.

The sugar-cane must be regarded as a native of China, since it has been pretty accurately shown that its culti-

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vation was prosecuted in that empire for two thousand years before sugar was known in Europe, and for a very long period before other eastern nations became acquainted with its use. A knowledge of the origin of sugar-cane was correctly revealed in the middle of the thirteenth century, by the celebrated traveller Marco Paolo, though it was partially known much earlier. The plant was soon conveyed to Arabia, Nubia, Egypt and Ethiopia, where it became extensively cultivated. Early in the fifteenth century the sugar-cane first appeared in Europe. Sicily took the lead in its cultivation; thence it passed to Spain, Madeira, and the Canary Islands; and shortly after the discovery of the New World by Columbus, this plant was conveyed to St. Domingo (Hayti) and Brazil, from which latter country it gradually spread through the islands of the West Indies, and thence at a later period to the southern part of the United States, and particularly Louisiana.

Manufacture.—Sugar is manufactured in the following manner:—The canes, when ripe, are cut close to the ground, stripped of leaves, and carried in bundles to the mill-house, where they are then subjected to pressure between iron rollers, placed either vertically or horizontally. The *cane-juice* thus procured is an opaque liquid, of an olive-green colour, saccharine taste, and balsamic odour. Its specific gravity is somewhat greater than that of water. It consists of *water*, *sugar*, *gum*, *green fecula*, *extractive*, *gluten*, *acetic* and *malic acids*, *acetates of lime and potash*, *super-malate* and *sulphate of lime*, and *lignin*.

From the mill, the juice is conveyed to a copper cauldron, called the clarifier, where it is mixed with lime, and heated. The clear liquor is then drawn off and put into a copper *boiler*, where it is evaporated and

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skimmed. It is then conveyed through a series of boilers, the last of which is called the *teache*. When it has acquired a proper tenacity and granular aspect, it is passed into a wooden *cooler*, where it is allowed to crystallize or *grain*. The concrete sugar is then placed in casks (usually sugar hogsheads) with holes in the bottom, each of which is partially closed by the stalk of a plantain leaf. Here the sugar is allowed to drain for three or four weeks. It is then packed in hogsheads, and is ready for sale and exportation, under the name of *Muscovado* or *raw* sugar. The uncrystallized portion is termed *molasses*. In Jamaica a mixture of water and molasses, with the skimmings of the clarifier and evaporating coppers, is fermented, and a vinous liquid thereby obtained, which, by distillation and rectification, yields *rum*, *spiritus sacchari*. (Pereira, *Mat. Med.* p. 581–2.)

Raw sugar contains several impurities, such as lime, tannic acid, glutinous and gummy matter, and free acid, from which it is freed by refining. For this purpose it is dissolved, heated with bullock's blood, (called *spice*,) or with hydrate of alumina, (termed finings,) percolates slowly through coarse-grained animal charcoal, then boiled under diminished atmospheric pressure; the syrup is drawn off and transferred to conical moulds of earthenware or iron, which are stopped up, and after a time carried to the *curing floor*, and placed in pots in order to allow the green syrups to drain off. The loaves are then either *clayed* or *sugared*: that is, either clay and water, or a saturated solution of pure sugar is poured in the base of the leaf, so as to detach colouring matter and other impurities. The loaves are afterwards dried in a stove and put in blue paper for sale.

The following may be regarded, Mr. Pereira thinks,

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as an approximation to the produce of 112 lbs. or 1 cwt. of raw sugar by the above process:—

Refined sugar, - -	79 lbs.	
Bastard, - - -	17	
Treacle, - - -	16	(12 lbs. solid matter)
Water, - - -	4	
Raw sugar, - -	112	

The *green syrups* above mentioned, which were drained off from the moulds, are made into an inferior kind of refined sugar, (*brown lumps.*)

Common sugar, by the slow evaporation of its aqueous solution, is crystallized, and then acquires the name of *white sugar candy*. In this state, sugar is used for domestic purposes in Canton, and probably in other parts of China. Sugar, altered by heat and flavoured, constitutes several preparations of the confectioner, as *barley sugar*, (*saccharum hordeatum*,) &c. If the heating be carried still farther, sugar becomes brown, evolves a remarkable odour, loses its sweet taste, and acquires bitterness; it is then called *burnt sugar* or *caramel.*

Sugar from *beet-root* is manufactured to a great extent in France. The first trials made under the direction of the National Institute in 1800, were not successful; but, in 1810, at the instigation of Napoleon, who had excluded West India produce from France, M. Deyeux was more fortunate. An imperial manufactory of sugar was forthwith established at Rambouillet; imperial schools were instituted for instructing pupils in the process; premiums were given for the best samples of sugar, and thus, by 1812, the manufacture of beet-root sugar might be considered prosperously set on foot. (*Lib.*

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Entert. Know.) I remember seeing M. Thenard exhibit to his class specimens of beet-root sugar and of cane sugar, in lump and in solution, and hearing him declare that neither to the eye nor taste was there any perceptible difference between the two. He added that Marshal Marmont, among others, was largely and profitably engaged in the culture of the beet and its manufacture into sugar. This was in 1820. The consumption of sugar in France is estimated to amount, at present, to 120,000 tons, and of this amount no fewer than 80,000 tons are said to have been supplied in 1838 by the beet-root plantations. But the production of beet-root sugar is not confined to France; on the contrary, it is rapidly extending to Belgium, Germany, Prussia, and even Russia.

Sugar from the sap of a variety of Maple, is made in large quantities in the United States, through a wide geographical range, extending from Canada to Tennessee. In some districts the inhabitants are entirely supplied from this source. In the latter part of the winter and beginning of the spring, the maple is tapped for the preparation of sugar. In a letter just received from a relative in Tennessee, dated January 31st, he says, "We are making sugar now from the maple tree." The quantity of juice afforded, varies with the tree and the season; from two to three gallons being about the daily average yield of a single tree; but some trees have yielded more than twenty gallons in a day, and others not more than a pint. The process for boiling the juice does not differ materially from what is followed with the cane juice in the West Indies. It is necessary that it should be boiled as soon after it is drawn from the tree as possible; for if it is allowed to stand twenty-four hours, it is apt to undergo the vinous

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and acetous fermentations, by which its saccharine quality is destroyed. Though inferior both in grain and strength to that which is produced from the cane, maple sugar granulates better than that of the beet root, or any other vegetable, the cane excepted.

The following table, taken from Ure's Dictionary of Arts and Sciences, will give the reader an idea of the immense amount of sugar manufactured for the purposes of trade. It is headed, Quantity of Sugar brought into the Markets of the World in the year 1838.

	Tons.
British West Indies, - - - - - - -	160,000
Mauritius, 35,000 and British East Indies, 20,000, -	55,000
Java, - - - - - - - - -	36,000
Manilla and Siam, - - - - - - -	30,000
Dutch West Indies, - - - - - -	25,000
St. Thomas and St. Croix, (Danish), - - -	7,000
Martinique and Guadaloupe, (French), - - -	80,000
Bourbon, - - - - - - - -	20,000
Cuba, - - - - - - - - -	100,000
Brazil, - - - - - - - -	95,000
From Beet-root, in France and Belgium, - -	65,000
United States, - - - - - - -	65,000
	738,000

If we add the quanity of maple sugar made in the United States, which is almost entirely for consumption on the spot, to that which is in the market, the amount will be much greater than the above estimate; or 127,300 tons (2240 lbs. the ton), without counting what Kentucky and North Carolina may have produced. Of this amount, Louisiana made 113,500 tons cane sugar. Of the maple sugar manufacturing states, Vermont and New Hampshire made upwards of 5,300,000, New York upwards of 10,000,000, and Ohio nearly 7,000,000 lbs.

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The preceding table and statements will convey to the mind of the reader a clearer conviction of the general and great consumption of sugar throughout the world, than the most emphatic declarations to this effect. Sugar is now, we can readily see, reckoned a necessary of life, of almost universal use. An English writer holds the following language: "The scattered tribes of North American Indians spend the months of spring in their rude encampments, manufacturing sugar out of the juice of the maple; the five-and-twenty millions of the United Kingdom, employ, throughout the year, two hundred thousand tons of shipping to export five hundred millions pounds of sugar from their colonies. This enormous supply affords upon an average, twenty pounds of sugar to each individual of our twenty-five millions of population. Through the natural operation of our commercial power, this important article of comfort is placed within the reach of the humblest in the land, although the revenue received by the state from the consumers amounts to 5,000,000 pounds sterling annually."[1] (*Lib. Enter. Know.*)

Sugar is alimentary in conjunction with any other of the proximate nutritive principles of plants; and taken as it is with other articles of food, it may be regarded as increasing their nutrimental value. If we refer to its effects on man where and when it is eaten in the greatest quantity, we cannot but entertain a high notion of its properties in this way. During the sugar season in the West India Islands, every negro, says Wright, (*Med. Plants of Jamaica,*) on the plantations, and every animal, even the dogs, grow fat. The negro children have a certain allowance of sugar-cane at this season, which they suck with avidity, and with the same good effect as is noticed on their parents. A reference to the analysis of the juce of the sugar-cane, which I purposely introduced for illustrating the present topic, will explain why this, composite as it is in its nature, should prove eminently nourishing, although the purified sugar alone could not be relied on for the purpose. We can, therefore, admit, to the full extent, the facts, as they are narrated by so many persons in the West Indies, of the nutritive properties of the juice of the cane; without denying the accuracy of the conclusions of Magendie, and Tiedemann and Gmelin, that animals fed on sugar alone, soon began to manifest feebleness, and, after a time, positive disease. The injurious effects ascribed to sugar, are proved to be imaginary, by the fact, that individuals have consumed large quantities of it, for a long series of years, without suffering any ill consequences. The fondness of children for sugar is cited as instinctive, since nature, by placing it in milk, evidently intended it to form part of their nourishment during the first period of their existence. We must, therefore, regard the notion that it injures the teeth, as a device of overthrifty mothers to economize sugar. As a proof of this error, Dr. Wright mentions the familiar fact, that no people on the earth have finer teeth than the negroes in Jamaica. Sugar has acquired a bad name among dyspeptics, mainly on account of the articles into the composition of which it enters, and which, when eaten, derange digestion; such are cakes, sweetmeats, and confectionary. There are, undoubtedly, cases of disordered stomach, in which sugar, in any form, excites flatulency and heartburn, by the acid to which its fermentation had given rise. In certain morbid conditions of the renal organs, sugar is inadmissible. Its utility as a mild vermifuge is admitted.

Sugar is an excellent preservative of fruits and other

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vegetable substances, which, when eaten with bread, on an empty stomach, are nourishing and wholesome. It is only in certain dyspeptics that the mucilage and pulpy matter in the original fruit disagrees.

Honey.—As akin to sugar, in its composition, taste and effects generally as aliment,—honey merits a passing notice here. This substance, though of vegetable origin, being secreted by the nectariferous glands of flowers, is gathered by the bee, and is partially modified by detention in the *honey-bag*, *crop* or *sucking stomach* of this animal.

Honey varies in its taste and odour, according to the age of the bees, and the flowers on which they have fed. *Clarified honey* is prepared by melting honey in a water bath and removing the scum. Honey may be regarded as a concentrated solution of *sugar*, mixed with *odorous*, *colouring*, *gummy* and *waxy* matters. The saccharine matter is of two kinds: one crystallizable, and analogous to the sugar of grapes; the other uncrystallizable, and similar to the uncrystallizable brown syrup of the sugar-cane. Mannite has also been found, which differs from sugar in not fermenting with water and yeast. (Pereira, *Op. cit.*)

The adulteration of honey with flour, is detected by mixing it with tepid water: the honey is dissolved, while the flour remains unaltered. A test is offered in iodine, which produces a blue colour if there be any flour present.

Honey was one of the first articles of human nourishment; and as such enters into the fabulous and traditional history of the Greeks, who imagined their first gods to live on milk and honey (ambrosia). The honey of Mount Hymettus, in Attica, and of Mount Hybla, in Sicily, so renowned in ancient times, is still excellent.

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The Pythagoreans, in imitation of their master, almost lived on bread and honey. Pliny relates that Pollio, who reached his hundred and fifth year, made great use of it, and that the Emperor Augustus having asked him by what means he had preserved his health, received for reply, "I have made use of oil externally and honey internally."

Honey is frequently mentioned in the Bible, both as pleasant in itself and indicating abundance and fertility in a country; thus Canaan is described as a "land flowing with milk and honey," a land of olive oil and honey. John the Baptist fed upon wild honey, which was found to be in the rocks up and down the country, or in hollow trees. Children were fed with milk, cream and honey. Mention is made not only of bee-honey, but, also, of grape-honey (must boiled to a syrup, and still used in Palestine), and tree-honey, which is found upon the leaves of particular trees and shrubs, having been thrown out by certain insects. As it was the sweetest and most delicious thing which was then known, before the knowledge and use of sugar, therefore, things that are sweet, pleasant and agreeable, are in scripture compared to honey. The greater cheapness and abundance of sugar, and its greater uniformity of taste and other properties, have gradually caused it to take the place of honey in popular favour. Honey is, however, still esteemed as a wholesome article of diet to the phlegmatic, and those with torpid bowels; but it is less adapted to the bilious and the young, and is not so proper in summer as in winter. Its tendency to cause pain in the digestive canal is such, that it has been replaced by syrups in the preparation of most medicinal compounds in which it was formerly prescribed. When collected from poisonous plants, honey

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partakes somewhat of their properties, and may in this way prove extremely deleterious to those who eat of it, as was the case with the army of Xenophon, in the celebrated retreat of the 'Ten Thousand.'

Honey, by being subjected to fermentation, is converted into mead and metheglin—drinks once much more in vogue than at present.

GRAPES (*Vitis Vinifera*). The vine flourishes in regions intermediate between those of the date, the pomegranate and the orange trees to the south, and the apple and the plum trees to the north; the peach has nearly the same range with the vine, but inclining rather to the southern limits of the latter. The vine is said to be a native of Persia; by the Phœnicians its culture was extended to Egypt, Greece and Sicily; thence to Italy and the south of France.

The vine is valuable for its rich and luscious fruit, which both quenches thirst and allays hunger; and while to a certain extent nutritive it is also medicinal. A diet of bread and grapes is occasionally recommended to invalids with consumption, and although it will not cure this formidable disease, yet it contributes more than most dietetic courses to an alleviation of the more troublesome symptoms, and in diseases simulating consumption would seem to be decidedly curative. The cultivation of the vine is relatively inconsiderable with a view to the use of grapes, either in their fresh or dried state; and hence as forming a portion of the food of man, they merit small notice. In a commercial point of view the case is far otherwise; the wine procnred from the fermented juice of the grape being an article which counts largely in the exports of some countries, particularly France, and Spain and Portugal with their dependencies the Canaries and Madeira; and, in less degree, Ger-

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many, Hungary, Italy and some of the Greek Islands. There is also some wine made in the southern part of Russia, particularly in the Crimea.

As a question of dietetics, the use of the fermented juice of the grape must be inquired into under two different circumstances; first, in reference to the inhabitants of the countries and districts where wines are made; and, secondly, to the people of the countries to which they are sent as articles of commerce.

The use and enjoyment of wines in the countries in which they are made, and in which alone they can with any propriety be regarded as the fermented juice of the grape without mixture and adulteration, are limited to a zone or belt of varying breadth, and with a mean temperature of 50° to 60° F. In Europe this is about twenty degrees of latitude, and in America, still less, or as some tell us, one half; being in the former continent between the 30th and 40th degree of north latitude, and in the latter extending from 25° to 40° north. In the southern hemisphere, the Cape of Good Hope just falls within the line of latitude adapted to the grape. But in speaking of climate as measured by degrees of latitude, we merely give an approximation to the fact as regards its application to the geography of plants or of animals. Elevations above the ocean and exposure to particular winds modify climate very much; and hence we are little surprised to learn that, in Chili, the vine has been cultivated with success, and on the table land of Mexico similar trials have resulted favourably. Shiraz, in Persia, in but 33° north, has been represented to be the southern limit for the cultivation of the vine in Asia; and yet in the province of Deccan, in Upper India, between the 17th and 19th degrees of latitude, twenty-three north, six species of grapes of fine flavour and in

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abundance are gathered. This region is at an elevation above the ocean, varying from 1500 to 1800 feet; and the mean temperature of the year 77° to 78° F.

France is the chief vine-growing country; it has been called the vineyard of the earth. A twenty-sixth part of France is devoted to the cultivation of the vine; equal to a tract of country nearly 200 miles long and 33 broad; and containing upwards of five millions of acres. There are but a few of the 86 departments into which France is divided, that do not produce grape for the manufacture of wine; but in the southern division of the kingdom, the cultivation of the vine is carried much farther than in the northern. Thus, in the thirty-two departments which Baron Dupin regards as belonging to the north, and having a superficies of 18,692,191 hectares, there are 342,883 hectares taken up with vineyards; whereas, in southern France, which includes fifty-four departments, and has a superficies of 34,841,235 hectares, there are 1,271,056 hectares taken up with vineyards. The proportion of wine manufactured does not however correspond with the relative of land in cultivation; being as 11 to 24. Various estimates have been made of the quantity of wine manufactured in all France, and of the proportion consumed at home, and of that exported to foreign countries. M. Chaptal (formerly minister of the Interior) supposed, in 1819, the vineyards to occupy 3,991,447 acres, (we omit the number in hectares,) and to produce 35,358,890 hectolitres,* or 778,237,384 gallons. In 1824, the Department of Indirect Taxes state the produce of wines to be 35,000,000 hectolitres, and the extent of the vineyards to be 4,274,398 acres. Baron Dupin repeats (1827) the estimate of Chaptal, but if he were to admit the same proportionate increase in the

* The hectolitre is 26.42 English wine gallons.

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cultivation of the vine as he does of the cerealia in France during the period which elapsed between this estimate and the time he wrote, viz. a tenth, it would make the product of the vineyards rising 856,000,000 gallons. M. Cavoleau, (1827) who obtained the prize from the French Institute for his *Œnologie Française*, gives the produce of the vines of France as 813,165,195 gallons. The minister of commerce stated in 1828, that he believed the produce of France to be 40,000,000 hectolitres or above 886,000,000 gallons. The last returns are those published in 1831, by the Statistical Society, exhibiting a produce of nearly 45,000,000 hectolitres, or about 1,000,000,000 gallons.* This estimate it is supposed will apply, with some slight addition, to 1833. I shall adopt, as the medium produce of the French vineyards, and take as a basis for subsequent calculations, the estimate made by a committee, instituted to inquire into the duties on drinks in France. The whole produce is stated to be 42,000,000 hectolitres, or 924,020,000 gallons, and to be thus disposed of.

	Gallons.
Consumed by the proprietors, not being subject to duty,	198,000,000
Duty recovered on consumption,	308,000,000
Fraudulent consumption,	105,466,000
Entire home consumption,	611,466,000
Employed in the manufacture of brandy,	141,680,000
Loss and waste among the growers,	91,344,000
Loss in conveyance and in the hands of dealers,	44,000,000
Exported,	24,530,000
For the manufacture of vinegar,	11,000,000
	924,020,000

* Bowring's Second Report on the Commercial Relations between France and England.—Silk and Wine, p. 95.

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If these statements, says Dr. Bowring, are correct, and they are official statements, it would appear that the consumption in France, taking the population at 33,000,000, and estimating the amount consumed (viz: 611,446,000 gallons), that the annual average consumption of wine is about 18 gallons per annum per individual. A French medical Journal, (1829,) the title of which I did not note at the time, gives 700,000,000 gallons of wine as the amount of home consumption in France. The quantity of cider and beer drunk by the French people will be noticed hereafter.

The disproportionate consumption of the towns to the open country in France is very remarkable: 7,500,000 inhabitants of towns consume 8,670,293 hectolitres or nearly 26 gallons per individual; 25,500,000 inhabitants of the country consume 19,122,707 hectolitres, or about 16½ gallons per individual:—that is, supposing all the wine which enters the towns pays the duty; but as there is good reason to believe that one-third, at least, escapes, the average consumption in the towns may be estimated as double that of the agricultural districts, though so large a proportion of that consumed in these districts is duty free."—(*Bowring, 2d Rep.* p, 90.) To the towns, therefore, must we look for the hygienic effects of wine drinking and of the culture of the vine. This point of inquiry will be taken up when I shall speak of the dietetics of France and England, and more especially as relates to the intoxicating drinks used by the people of these two countries.

It may not be thought irrelevant, at any rate uninstructive, if I detain the reader by a few remarks on the condition of the proprietors and cultivators of vineyards in France. They will sadly interfere with the poetry with which the vine-clad hills of France and their inha-

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bitants have been invested, and may prove the first step towards undeceiving some philanthropists at home respecting the imputed advantages of cultivating the vine largely in the United States, with a view to the manufacture of wine and its consumption by the people. As regards the value of vineyard property, we learn the following particulars from Dr. Bowring:—M. Gautier, the then president of the Bordeaux Chamber of Commerce, and since a peer of France, has said that an estate of the estimated value of 15,000 francs (about $3000) per annum, in the last generation, produced absolutely nothing now. He even declared that there was scarcely an acre of vineyard culture south of France which paid the cost of cultivation. The cost of cultivation is estimated by Mr. Rambuteau at double the value of the rental, while the average production of the other objects of agriculture is estimated at two-fifths of the rental. Of the situation of the vine-growing country, the representatives of the proprietors to the Minister of Finance give a melancholy picture. "The value," say they, "of our productions, is almost wholly destroyed—our properties perish—thousands of families are precipitated into misery, and given up to despair; already large districts of land, where nothing but the vine flourishes, are abandoned to their ancient sterility." This state of things is attributed by Dr. Bowring to the French system of prohibition duties on the produce of other countries. The vine growers of the department of the mouths of the Rhone, assert that, since 1821, their produce is diminished from 646,000 hectares, of a value of 7,000,000 francs, to 367,000 hectares, of a value of 2,936,000 francs. The proprietors of vineyards of the Gironde, one of the chief wine districts in France, in

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their petition to the Chamber of Deputies, (1829,) say that they are losing 12 per cent. per annum on the cost of cultivation. Similar statements were made by the vine growers of Toulouse, Côte d'Or, Oriental Pyrénées, and others. These representations apply to the produce of the vineyards in general. Some estates are a source of wealth to their owners; but the small proprietors could not support themselves were they not also engaged in farming.

As to the small labouring proprietors, and labourers, and jobbers in the vineyards, their situation, physically and mentally, is poor indeed. Those of Champaigne make the best appearance they can by severe economy: in bad years they borrow at usurious interest to free themselves, and often hasten their ruin. They are more sober and orderly than the manufacturing classes in general. The daily labourers in the vineyards of the Gironde are represented by their own countrymen in their reply to Dr. Bowring's queries, to be without instruction, to be in general "endowed with great penetration, and even with ingenuity, but they are ignorant, superstitious, devoid of religion, proud, setting at defiance the educated and the rich, selfish, little fond of work, yet kind and hospitable. Family ties have little weight among them: the sickness of one of their cattle distresses them more than that of their wife or child. Almost all of them live without care for the future, and die unregretted." Their amusements are "dancing, public houses, and gambling." But yet their sobriety is said to be worthy of imitation. Their drink is *piquette* wine, a liquor made of the wastage of the wine barrels, the remnant of grapes, &c., which are subjected to a kind of fermentation bordering on the acetous. Piquette

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is an acid watery drink. In Medoc district, the amusements of the labourer in the vineyards are the public house. The domestic arrangements of these people, as well as of the vine-dressers, are in general bad, and of household economy, the source of household comforts, they are utterly ignorant. A vine-dresser receives four barrels of small wine for himself and family. The inhabitants of the wine countries in France are from their infancy accustomed to drink piquette, and it is the ordinary drink of the poor.

Baron Dupin devotes the sixth book of his work, (*Forces Productives*, &c. Tome II, p. 429, *et seq.*) to a comparison between the North and the South of France, on the score of territory, agricultural and manufacturing industry, schools, &c., in which he shows conspicuously the superiority, in all the fruits of industry and cultivation of intellect, of the departments of the north over those of the south. The chief wine districts are in the latter. The two divisions bear the proportion in relation to population as 13 to 17, and to agricultural labourers as 7 to 11, and superficies of soil as 18 to 34; the smaller numbers being on the side of the north—the larger representing the south. But yet, with all these disadvantages, the people of northern France derive a larger mean income per individual from the soil and from manufacturing industry, and pay more taxes than their countrymen to the south: their agricultural products are to those of the latter as 5 to 6, although the proportion of labourers is, as just stated, 7 to 11, and of surface for cultivation 18 to 34. Even in the produce of the vineyards they procure wine in the proportion of 11 to 24, although the land taken up with vineyards in the two divisions is as 1 to 3.

On the subject of primary instruction, northern France

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had only a fifth of her communes wanting in primary instruction, whereas one-half of the communes in the south were deficient in these advantages. The south sends one scholar where the north sends two scholars to a primary school. Of the patents for inventions, discoveries, &c. on 1st July, taken out from 1791, to 1st July, 1825, there were 1699 from the north and 413 from the south.

In northern France, says Dupin, the inclemency of the climate prevents the culture of the olive, the caper, the orange, and the citron: it does not allow of the cultivation of Indian corn and the mulberry, except in some of the departments bordering on the southern division; nor of the vine being cultivated in Normandy, Picardy, Artois, French Flanders, and in Ardennes. Notwithstanding these privations, he continues, the mass of the people of the north, having more instruction, activity and industry, procure from the soil, taking equal surfaces as a standard of computation, a net produce almost double that of the people of the south.

In making the above comparison, after Dupin, and repeating the statements which preceded it, I do not pretend to overlook the modifying influences of climate and difference of race, nor to attribute the contrasted picture solely to the fact of the south being the country of vineyards, and the north, except Champaigne, being deficient, or having much less of its soil cultivated, in this way. My purpose is, to show that the cultivation of the vine, so far as relates to the manufacture of its fruit into wines and brandy, gives no activity, affords no general incentive to the powers of man, does not quicken any germ of civilization into a display of superior industry, literature or science; but, on the contrary, that the people thus engaged are behind their countrymen, who live

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under the same government and institutions with themselves, in all that makes a useful citizen and contributes to the sum of human worth and intelligence. How far the consumption of the produce of the vineyards when manufactured into wine and brandy affect public and individual health, and prove auxiliary or inimical to sobriety and industry, will be a subject of inquiry in the chapter on Drinks.

Independently of the use of grapes for the purpose of manufacturing out of their juice an intoxicating liquor, wine, by fermentation, and a still more potent and destructive one, brandy, by distillation, this fruit is eaten, on the spot, alone or with bread; or at a distance, after packing and transportation in its still recent state, and also in the shape of raisins. The fresh juice, when mixed with water, or inspissated into a kind of extract, and also mixed with water, forms in both instances a grateful and nutritious beverage.

But whilst we claim a vast superiority for grain over vineyard agriculture, in reference both to the amount of food furnished to man and to the ulterior benefits arising out of full nutriment and the profitable exchange with other countries whose soils are less fertile, we ought to be aware that all the land given to the vine is not so much abstracted from the cultivation of grain. A good deal of it is broken and hilly ground, with a gravelly or sandy soil, too light for a profitable produce of grain. On this point, and in elucidation likewise of the proper hygienic objects in the cultivation of the vine, the following observations made by the Rev. Dr. Duff in his journey through France to India by the way of Alexandria may be appropriately introduced:—

"In those countries, mantled with vineyards, one cannot help learning the true intent and use of the vine in

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the scheme of Providence. In our own land wine has become so exclusively a mere luxury, or what is worse, by a species of manufacture, an intoxicating beverage, that many have wondered how the Bible speaks of *wine*, in conjunction with *corn*, and other such staple supports of animal life. Now in passing through the region of vineyards in the east of France, one must at once perceive, that the vine greatly flourishes on slopes and heights, where the soil is too poor and gravelly to maintain either corn for food, or pasturage for cattle. But what is the providential design in rendering this soil—favoured by a genial atmosphere—so productive of the vine, if its fruit become solely either an *article of luxury* or an *instrument of vice?* The answer is, that Providence had *no such design*. Look at the peasant and his meals in vine-bearing districts. Instead of milk, he has a basin of pure unadulterated 'blood of the grape.' In this, its native original state, it is a plain, simple, and wholesome liquid, which at every repast becomes to the husbandman what milk is to the shepherd—not a luxury, but a necessary—not an intoxicating, but a nutritive beverage. Hence, to the vine-dressing peasant of Auxerre, for example, an abundant vintage, as connected with his own immediate sustenance, is as important as an overflowing dairy to the pastoral peasant of Ayrshire. And hence, by such a view of the subject, are the language and the sense of the scripture vindicated from the very appearance of favouring what is merely luxurious or positively noxious, when it so constantly magnifies a well replenished wine-press, in a rocky, mountainous country, like that of Palestine, as one of the richest bounties of a generous Providence."

Palestine, even in modern times, yields grapes of a size which reminds travellers of the bunch found in the

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valley of Eschol, that required two men to carry it. A German traveller (Christopher Von Neitzchutz) relates, that he has seen bunches of grapes in the mountains of India, which measured half an ell long, and the leaves were like palms. Rosenmüller mentions the large quantity of grapes and raisins which are daily sent to the markets of Jerusalem and other neighbouring places. Hebron alone, in the first half of the eighteenth century, annually sent three hundred camel loads, that is nearly three hundred thousand weight of grape-juice or honey of raisins, into Egypt. The Damascus grapes, of the present time, are found to weigh upwards of twenty-four pounds the bunch. I have, in a preceding page, spoken of the varieties of fine grape cultivated for the table, in the Deccan (Upper India).

The unfermented juice of the grape and sap of the palm-tree are, as we learn from Captain Charles Stuart, common and delightful beverages in India, Persia, Palestine, and other adjacent countries. *Must*, or the expressed and unfermented juice of the grape, was used by the Egyptians at an early date, (Gen. xi. 2.) Another mode of using the juice of the grape for purposes of drink, was to evaporate the more watery portion, by which the remainder was thickened and could be kept for a length of time without farther decay. When wanted for use, it was made, by the addition of water, not only a refreshing, but a somewhat nutritive drink, as its mucilage or extractive matter and sugar were still retained. Dr. Russell, in his history of Aleppo, thus speaks of the practice in modern times in that part of the world:—"The inspissated juice of the grape (*sapa vini*), called here *dibbs*, is brought to the city in skins, and sold in the public markets: it has much the appearance of coarse honey, is of a sweet taste, and in great use

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among the people of all sorts." This extract, as it may be called, of the juice of the grape mixed with water, and allowed to remain in this state for a time, would undergo a slight acetous fermentation, rendering this drink analogous to the light acescent wines used by the people of southern Europe, or to the *piquette* already described.

Grapes for table use, of fine flavour and large size, are procured in considerable quantities in England in hot-houses; and, as we learn from notices in the early historians of that country, vineyards were numerous and profitable in the southern part of the island.—Several kinds still ripen well in the open air. Vineyards are noticed in the Doomsday Book, as also by Bede, as early as the commencement of the eighth century. The isle of Ely was expressly denominated the *Isle of Vines*, by the Normans. Few ancient monasteries were without a vineyard attached to them. Malmsbury mentions the county of Gloucester as excelling every other part of the country, in his time, in the number and richness of its vineyards.

The Duke of Portland made a present to the Marquis of Rockingham, in 1781, of a bunch of grapes that grew in his vinery, which weighed nineteen pounds and a half: it was nineteen inches and a half in the greatest diameter, four feet and a half in circumference, and twenty-one inches and three-quarters in length. It was conveyed to Wentworth House, a distance of twenty miles, by four labourers, who carried it suspended on a staff, in pairs, by turns. The vine at Hampton Court Palace, near London, which all travellers who visit the palace have seen, was planted in the year 1769: it has a stem of thirteen inches in girth, and a principal branch one hundred and fourteen feet in

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length, which, in one year, produced two thousand and two hundred bunches of grapes, each weighing, on an average, a pound. George III. enjoyed the fruit of this vine half a century. Fruit was the only luxury in which he indulged himself, and that was cultivated in the royal gardens to the highest perfection, and served at table in great abundance. Mr. Phillips (*Pomarium Britanicum*), who gives the preceding particulars, does not add, that the next George (IV.) preferred the manufactured juice of the grape, to that which was matured and evolved by nature on the vine. The contrasted lives of the two men, both in their duration and manner of passing them—the father living to an advanced age, exempt in a great measure from bodily disease, except that one of the brain, to which he was predisposed by inheritance, and a model in the discharge of his conjugal and domestic duties; the son, debauched and profligate, heartless and selfish, and regardless of all the bonds of affection and duty—furnish no bad commentary on their different tastes on the score of regimen.

Mr. Eden planted a vine, of the Black Hamburg sort, at Valentine House, Essex, in the year 1758,—which is the parent of the vine at Hampton Court; it has extended itself to upwards of two hundred feet in length, and is so productive that two thousand bunches of grapes ripened on it in the year 1819. Speechly describes a vine, which was growing in the open air at Northallerton, in Yorkshire, in 1789, that had once covered a space containing one hundred and thirty-seven square yards; and it was judged, that, had it been permitted, it would have extended to three or four times the room. The circumference of the stem, a little above the ground, is three feet eleven inches: it is

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supposed to have been planted one hundred and fifty years ago.

In Jamaica (continues Mr. Phillips) and some other of the West India islands, the vine produces two, and often three crops a year. Both Brown and Lunan observe, that grape-vines produce most abundantly in Jamaica, particularly the Muscadine, which ripens all its berries nearly at the same time, and has clusters of the fruit from eight to ten pounds weight; the pulp of which has been found less watery and more fleshy, than the same fruit in the south of France, and yet the making of wine, even for the consumption of the island, has never been attempted.

In the United States, the number of species of wild grapes is considerable, no fewer than seven having been ascertained to flourish in their confines. Good table grapes, as the Catawba, Isabella and Elsenburg, have been obtained by cultivation from the native species, and are now frequently to be met with. In North Carolina, Kentucky, District of Columbia, and at Vevay, in Indiana, vineyards have been cultivated for the purpose of manufacturing wine from the grapes. In other places, as near Philadelphia and Boston, gentlemen of fortune and liberal tastes, have succeeded, after large expenditure, in raising in hot-houses an abundant supply of richly-flavoured grapes. We must hope, that these efforts, on a more economical plan, will be imitated by professional gardeners and gentlemen farmers, so that the people will be supplied with this delightful fruit in abundance somewhat commensurate with that of peaches, apples and melons.

Grapes gathered just before they reach maturity, and having been divested of any adhering moisture and carefully packed away in some light and dry sub-

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stance, such as saw-dust, will keep for a length of time, —and in this state may be transported to great distances. Large quantities thus gathered and packed, are imported into the United States from Malaga, and into London and other parts of England from France. The practice was known to the ancients; and the fruit in this state was, by the Romans, called *uvæ ollares*, when the grapes were put away in jars hermetically sealed with pitch, or in well closed vessels with dry straw.

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CHAPTER X.

FRUITS.

Raisins—varieties of, and whence procured—quantities imported.—Currants.—Pomegranate—its pleasant juice—seeds much used.—Sweet Orange—its juice—Orangeade—Seville orange—its rind—Orange flower water—value of the orange trade—Lemon, a modern fruit in Europe—Lemon juice, its composition and effects—Lemonade as a drink and a febrifuge.—Citric acid—its nature and uses.—Lime.—Citron.—Shaddock.—Melons—their abundance and excellence in Asia and Africa, southern Europe and America—varieties of—Cantelleupe—Caution in use of—Water-melon—its extensive use in U. States—its alleged bad effects—Pumpkin—Cucumber—large use of, and various fashions of preparing it for table.—Apple—its range and varieties, and where most abundant and finest—Mode of keeping apples—Produce of the orchards in England, U. States, and France—Flavour of the apple—with whom disagreeing—Pulp with flour makes good bread—Apple jellies and confections.—Pear—its composition and effects.—Quince—as a preserve, marmelade—Virtues of its seeds.—Peach, its excellence and abundance—is palatable and nutritious—Dried peaches—Deleterious properties of other parts of the peach tree.—Plum.—Prunes.——Almond—its kernel the part eaten—Almond oil—the husk to be removed from the kernel.—Cherry—its inferior quality in the United States—Cherry brandy.—Currant—varieties of.—Gooseberry.—Raspberry.—Strawberry.—Cranberry.—Tamarind.

Raisins.—Grapes, partially deprived of their watery part by drying, but still retaining their sugar and mucilage, are largely used under the name of raisins, (*uvæ passæ*, or, as distinguishing them from currants, *uvæ passæ majores.*) The fruit is prepared for this purpose in various ways; being in some places dried in the sun,

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in others immersed in ley; but in all cases it is desirable that the grapes should be perfectly ripe before they are gathered. In order to insure more completely this result, the leaves and vine, which partially cover the bunches of the fruit, are drawn to one side, so as to expose it fully to the sun. The damaged berries are carefully removed.

In Granada, the finest kind of raisins (viz. the *Muscatels* and *Blooms*) are sun-dried, while the *Lixias*, so called from the liquor in which they are immersed, are dipped in a mixture of water, ashes and oil, and afterwards sun-dried. In Provence, the ley is heated to boiling, and in this state the grapes are immersed in it, and allowed to remain until the skin of the berries begins to be wrinkled. They are then put on hurdles and dried in the sun. By this treatment, the juice exudes and candies on the fruit. Dillon states that the sun-dried raisins have their stalks half cut through, while the bunch remains on the vine. The raisins of Valentia are prepared by steeping them in boiling water to which a ley of vine stems has been added. Some raisins are said to be dried in the heat of the oven. Raisins are imported in casks, barrels, boxes and jars. "The varieties known in the market are distinguished partly from their place of growth, as *Valentias* and *Smyrnas;* partly from the variety of grape from which they are prepared, as *Sultanas*, *Blooms* and *Muscatels;* and partly from the mode of curing them, as *Raisins of the sun*. Muscatels are the finest—*Sultanas* are stoneless." (*Pereira*, *Op. cit.*, p. 1217–18.) Raisins contain mucilage, sugar, and an acid. If they be steeped in water, at a moderate temperature, for a short time, fermentation will ensue, and a slightly acidulous and pleasant drink may in this way be prepared. Carefully watched in the

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stages of fermentation, as in the case of the fresh juice of grape, a wine is procured, from which brandy may be distilled. In Portugal, an inferior brandy is obtained in this way, for the purpose of drugging Port wine, before it is sent to the English market.

The imports of raisins into Great Britain in 1831, were 216,283 cwt., of which 105,066 came from Spain, 100,458 from Turkey, and 7,036 from Italy. Nearly a million of dollars worth of this fruit were brought to the United States, in 1840, from the Mediterranean.

Currants, or *Corinthian Raisins*, (*Uvæ passæ minores.*)—These are obtained from a remarkably small variety of grape, called the *Black Corinth.* They were formerly produced at Corinth, (whence they received their name,) but are now grown near Patras (on the isthmus of Corinth), and in the Ionian isles, especially in Zante and Cephalonia. At Zante they are gathered in August, disposed in couches on the ground, to dry, cleaned and laid up in magazines, (called *seraglios*,) where they eventually adhere so firmly together, as to require digging out. They require eight, ten, or fourteen days for drying: for exportation they are trod into barrels. These currants form quite an article of commerce; the amount exported annually for four years, ending 1832, from the Ionian islands, being somewhat less than nineteen millions of pounds. The island of Candia produces, we are told, no less than seventy-two varieties. The Lipari islands also furnish them: they are here packed in barrels of about 200 pounds each, for exportation.

The diminutive grape, which is the currant of commerce, when eaten in its fresh state, is gathered before it is quite ripe, as then it is too sweet. Like the larger grape, it is deemed a useful article of food, with some

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farinaceous substance, in convalescence and in certain chronic maladies.

POMEGRANATE, (*Punica Granatum.*) Originally an inhabitant of the same region (northern Africa) with the date, the pomegranate is now found in different parts of Asia, viz., Bengal, China and Persia, and in the countries of southern Europe bordering on the Mediterranean. It is repeatedly referred to in the Bible, (Numb. xiii. 23; Deut. viii. 8, &c.) Homer also mentions it. The leaves, the flowers and the fruits were employed in medicine by the ancients.

The pomegranate was first brought to Rome from Carthage, in the time of Sylla. Pliny, who describes nine varieties of this fruit, says, that the territory of Carthage claims to itself the Punic Apple, (*Malus Punica,*) which some call pomegranate, from the flowers of which we get the colour to dye cloth, called *puniceus* (pink or light red.)

The pomegranate has been planted in the West India Islands, where the fruit grows larger and finer flavoured than in Europe. The juice of the fruit has a pleasant acidity, combined with some degree of astringency, which renders it peculiarly fitted to quench thirst and allay feverish heat. The fruit cut into segments and immersed in water, was recommended for the same purpose.

The pomegranate in most parts of Persia, says Foster, has a thin soft skin, and contains a large quantity of juice, than which nothing in hot weather, or after fatigue, can be more grateful. The juice mixed with sugar and water forms a kind of lemonade, which has a very pleasant flavour.

The pomegranate is common in Syria and Palestine, particularly in the gardens of Aleppo. The ripe fruit is

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in abundance in August, and is then laid up for a winter stock. There are three sorts; a sour kind, a moderately sweet kind, and a very sweet kind. The juice of the first is used instead of verjuice, or the juice of the unripe grapes. The others are eaten at table, after being cut open, the seeds taken out, strewed with sugar, sprinkled with rose water, and served up on little plates. The seeds, according to Russell, constitute an important culinary article, being used for conserves and syrups. This fruit was much prized by the Israelitish people, as appears not only by its description among the products of the land of Canaan, but also by the murmuring of the tribes when they came into the desert of Zin. "Wherefore," said they, "have ye made us to come out of Egypt into this vile place? It is no place of seeds, or of vines, or of pomegranates."

Sweet or Common Orange, (*Citrus Aurantium.*) This delightful fruit, so lavishly spread over different parts of Asia, and particularly China, has only been introduced into Europe since the twelfth century, when several varieties of it were cultivated in Italy; and thence taken to Provence, Spain and Portugal. Another and more correct view is, that it was first introduced by the Portuguese from the East. I speak now of the sweet orange. It abounds at present in the Cape de Verd and other African islands, and in the Azores and the West Indies; and is becoming plentiful in Louisiana and Florida, in our own country. Previous to 1822, so abundant was the growth of this fruit on the coast and along the whole shore of the gulf in Louisiana, that oranges were lying under the trees as apples are at the north, after their maturity. A severe frost in the winter of that year destroyed the trees quite to the ground; but the roots have thrown out new leaves and branches,

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which are again bearing fruit. "Orange trees have been grown in the southern parts of Devonshire (England) for more than 100 years past. When trained to walls they produce large, handsome fruit, but not of equal value to the lemons in the same situation." In Portugal they form compact groves. The trees require much artificial watering, and they are propagated by seed, and afterwards by grafting on these seedling trees. The Maltese graft their orange trees on the pomegranate stock, which causes the juice to be of a red colour, and the flavour to be more esteemed. In Portugal one single tree frequently bears 1500 oranges, and examples are not wanting of their bearing 2000, and sometimes, though rarely, 2500.

The juice of the orange is peculiarly refreshing, by its saccharo-acid taste, and is well calculated to allay, as it so often does, feverish thirst. As a dessert, it is superior to most other fruits. Orangeade, or the juice mixed with sugar and cool water, is a beverage as superior in its flavour as in its healthfulness to wine. But these praises do not extend to the pulp of the fruit, which is indigestible; the same objection lies against the inner covering or lining of the peel. It must be added, also, that oranges, when gathered too early, as they often are for exportation, and kept too long, do not contain the properly matured juice, and hence are not fitted for weak stomachs. The peel contains an essential oil, and has, when dried, a grateful bitterness, by which it is a pleasant and, on occasions, a useful condiment.

The rind of the *Seville Orange* (*Citrus Vulgaris*), being considerably more bitter than that of the sweet orange, has more reputation as a stomachic and tonic. A watery infusion ought to be preferred to a tincture. The juice of the Seville orange is gratefully acid, with a

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slight degree of bitterness. It consists of nearly the same principles as lemon juice. *Orange-flower water* has a fragrant odour, and added in a moderate quantity to cool water, makes a pleasant beverage.

The remarks of Mr. McCulloch, (*Com. Dict.*) that the orange trade carried on by Great Britain is of considerable value and importance, applies also to the United States. Oranges, he says, "are not much more expensive than most of our superior domestic fruits, while they are perhaps the most wholesome and refreshing of those of warmer climates. The entries for home consumption amounted in 1831 and 1832, at an average, to 270,006 boxes a year; and assuming each box to contain 700 oranges and lemons, the number entered for consumption will have been 189,424,000." In addition to the foreign supply, which is considerable, the growth at home annually increasing, will, it is hoped, render this delightful fruit as abundant and easily procurable by the people in most parts of the United States, as the peach and the apple are in particular sections.

Lemon (*Citrus Limonum*).—It is supposed that the Greeks and Romans were unacquainted with the orange and lemon, which only became known to Europeans at the time of the Crusades. It is more probable that they did not succeed in introducing them into Greece and Italy than that they were ignorant of them. (See Pliny, Book XIII, Chap. III.) But although Assyria and Persia are represented to be the native countries of the lemon, we now obtain this fruit in the greatest quantity from Spain, Portugal, Italy, and the Azores. The Spanish lemons are most esteemed. Those from St. Helena are also much thought of. In some parts of Devonshire, lemon trees are trained to the walls, and require no other care than to cover them with straw or mats during

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the winter. The lemon tree is of much hardier nature than the orange. Hence, with moderate attention to protect it from frost, it may be, as it is, cultivated to a considerable extent in tubs in the middle States, so as to yield an abundant supply of good fruit.

Lemon-juice consists chiefly of an acid, which, diluted with water and a slight addition of sugar, constitutes the most refreshing and cooling of all beverages in hot climates or in summer of more northern latitudes. By a person overheated with exposure to the sun's rays in travel, or a feverish invalid, it is quaffed with a pleasure and a feeling of refreshment that cannot find their equivalent in the effects of alcoholic potations of any description. Happily, even now, after perverted ingenuity has made the inhabitants of nearly every part of the world cognizant of ardent spirits, the people of warmer climates, not spoiled by the miserable sophisms of drunken literature or the meteoric flashes of drunken poetry, still yield in large number to the instinct which seeks for coolness and refreshment of the system in vegetable acids and the fruits which contain them, either alone, as in the case of lemons and limes, or mixed with mucilage and sugar, as in the case of so many other fruits. In southern Europe, as in Italy and Spain, the populace of the cities and the inhabitants of the country will be found quaffing their cool lemonade or merely cool water, slightly acidulated with lemon-juice, with a *gusto* at the time, and a freshness of feeling and hilarity of expression afterwards, which neither Tokay nor Champaigne, still less Madeira or Port, could supply to their votaries. A happy change is going on, even in northern climates, and with Mr. Phillips, one can say with pleasure, and hope of still farther amelioration,

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"Lemonade and lemon-ices are as well known in the present day as punch was in the last age."

The vogue which lemonade acquired in France as a drink was owing to its being recommended by physicians of that country in putrid fevers, so called, in the beginning of the seventeenth century. About the year 1660, an Italian from Florence, having learned a process of freezing confectionary, conceived the happy idea of converting such beverage into ice. This found a ready sale, and was the occasion of so great an increase in the number of sellers of lemonade, that in the year 1676 the *Limonadiers* of Paris were formed into a company.

Carne, in his letters from the East, thus describes the pleasure of using an acidulated beverage in a hot climate:—"Fatigued with heat and thirst, we came to a few cottages in a palm-wood, and stopped to drink of a fountain of delicious water. In this northern climate (of England) no idea can be formed of the exquisite luxury of drinking in Egypt; little appetite for food is felt—but after crossing the burning sands, you reach the rich line of woods on the brink of the Nile, and pluck the fresh limes, and mixing the juice with Egyptian sugar and soft river water, drink repeated bowls of lemonade, you feel that every other pleasure of the senses must yield to this. One then perceives the beauty and force of those similes in Scripture, where the sweetest emotions of the heart are compared to the assuaging of thirst in a sultry land."

Lemon-juice has been extensively used in the cure and prevention of scurvy. More benefit, however, is derived from the free use of fruits in which this acid prevails than from the juice alone. As it is not easy to preserve the juice fresh for a length of time, chemistry has come to our aid, and shown how the acid of the

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lemon (called *citric*) is separated in a crystalline form. In this state it may be kept for any length of time and transported to all regions, and thus be in readiness for any exigency of appetite or disease. We must not confound this acid in its state of powdered crystals with another preparation called *essential salt* of *lemons*, which last is procured from wood-sorrel, and is in fact a salt composed of oxalic acid, the peculiar acid of this plant and on which its grateful acidity depends, united with potash. It is sometimes called, also, *salt of wood-sorrel*. *Citric acid* is found in the acid juices of other fruits besides lemon and lime, or fruits of the genus *Citrus*, as I have already had occasion to observe when speaking of citric acid in the last chapter.

Lime (*Citrus Æris*), is a small fruit, but contains more juice and citric acid than the lemon. It is brought principally from the West Indies.

Citron—malum citreum—(*Citrus Medica*).—This species of the orange tribe is a native of Asia, and cultivated in the south of Europe. Though analogous in its effects on the human system to those of the orange and lemon, this fruit is seldom brought to the table in the raw state. It makes excellent preserves and sweetmeats. Those who only know of the citron in this way will be surprised to learn that it sometimes attains a weight of more than twenty pounds.

The peel, or rather the outer rind of all the orange family, viz: the sweet and bitter oranges, the citron, the lemon, and the lime, contains an essential oil. These oils are used to flavour various dishes brought to table, also medicines, unguents, perfumery, and as *scouring drops* to erase the stains of grease, &c. The leaves and flowers also furnish this oil.

But the most noted of the *Citrus* genus for its essen-

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tial oil is *Citrus Bergamia*, or *Bergamot Orange*. The *volatile oil* or *essence of bergamot* imported from the south of Europe is procured from the rind of the fruit.

Shaddock, a species of the *Citrus*, derives its name from Captain Shaddock, who first brought it from the East Indies, where it is indigenous. It is now cultivated to a great extent in the West Indies, where the fruit often grows to the size of twenty inches in circumference, and yields sometimes nearly half a pint of clear juice, which in its taste and properties resembles that of limes and lemons.

Melons.—This fruit belongs to the extensive natural family—the *Gourd* or *Cucurbitaceæ*—in which we find both the edible and actively medicinal. There are two kinds—the melon proper (*Cucumis Melo*) and the water melon (*Cucumis Citrullus*.) I shall speak of the former of these first.

The melon contains a watery, sweet, and cooling pulp, which is slightly nutritious when taken raw. Like most of our esteemed fruits, it is of Asiatic origin; some refer it to Armenia, others to Khorassan. It is now spread over all central Asia, Africa, and southern Europe, and is particularly abundant in the western hemisphere. In the warmer regions, where the amount of food consumed by the inhabitants is small, and almost entirely of a vegetable kind, the melon comes in for a larger share of nutrimental produce than we who use it chiefly as a dessert would at first suppose. In Persia they reckon no less than twenty different kinds of melons. Some are so large that three or four are a full load for a man. An incredible quantity of them is taken to Ispahan, chiefly from Khorassan, on the borders of Little Tartary; they are said to bear a transportation of thirty days duration without injury. Sir John Chardin, indeed, tells of his

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having eaten melons at Surat which had been brought from Agra; and Mr. Coxe (Travels, vol. i, p. 255) says that a small sort of melon of exquisite flavour is sent from Astracan to Moscow, a distance of a thousand miles. It is generally considered to be the kind mentioned in Scripture.

There are many varieties of the melon in France, in the central and southern parts of which kingdom it is largely consumed, being served up at table with boiled meat after soup, in the houses of the wealthier, and eaten with bread, &c. by the poorer inhabitants. The *Honfleur* melon sometimes weighs twenty-four pounds.

The variety of melon most esteemed in every part of Europe is the *Cantaleupe,* which takes its name from the town of Cantaleupi, distant about fifteen miles from the city of Rome, where it has been cultivated since the Mithridatic war, it being one of the fruits brought from Armenia by Lucullus. The *Musk* melon appears to be a native of Tartary, where it is found growing wild. It has lately been found in great abundance in the sandy plains in the neighbourhood of Jeypour.

Care should be taken, in the cultivation of the melon, that it be kept apart, and in fact at some distance from other plants of the same great family, such as the cucumber, pumpkin, or squash; otherwise, the pollen or fertilizing powder from these will contaminate it, and affect the seeds for future plants.

In no region of the world is there a greater quantity and variety of melons than in the United States. They abound from Jersey to Louisiana, and furnish during the latter part of the summer and the autumnal months a refreshing and generally a wholesome treat to all classes.

Melons ought not to retain a good name with royalty,

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as it is on record that they have proved fatal to many crowned heads. It was this fruit eaten after supper that is accused of causing the death of George I. who expired in his carriage, (June 21st, 1727.) Simon Paulus says it has caused the death of four emperors. Pope Paul III. died of indigestion caused by Melons; and Clement VII. is said to have eaten of them with avidity during his last and fatal sickness. Frederick the Great frequently, even in his last sickness, gave himself an indigestion by eating three or four of them for breakfast. Much, however, of the bad name which this and some other fruits have acquired, proceeds from the improper time at which they are eaten. Wholesome in the morning, allowable as a dessert to a person in health, and even to some invalids after dinner, they may prove noxious when taken in the evening, and especially just before retiring to bed.

Melons are generally eaten with sugar or salt and pepper as condiments; by some to increase the pleasure of taste, by others with a view of preventing them from being oppressive to the stomach.

Water Melon.—This is the kind of melon which is so abundant in the United States, and which in some districts is entitled to the terms of praise used by Dr. Shaw, when he says, "The water melon is doubtless providentially calculated for the southern countries, and affords a cool, refreshing juice, assuages thirst, mitigates feverish disorders, and compensates thereby in no small degree for the excessive heat." Hasselquist says that the water melon, which is cultivated in the alluvial soil left by the inundation of the Nile, serves them for meat, drink, and physic. In the southern and middle States, the consumption of this fruit, both in town and country, by all classes, is immense—an evidence, this, both of its

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abundance and its cheapness. In southern Europe it is also a favourite, and the traveller in Naples will call to mind its use in that luxurious capital; ladies seated in their open carriages, are seen of a summer evening eating water melons.

The juice of this fruit is sweet and somewhat mucilaginous, and, when cool, it is exceedingly grateful and refreshing: the invalid, especially the dyspeptic, will find it most prudent not to swallow the pulpy part which remains after the juice is squeezed from it, and not to encroach at all upon the rind. In districts in which intermittent fever is common, melons have the reputation of often bringing on a return of the disease in those who eat of them. Without undertaking formally their defence, we may readily believe that the blame does not attach to the properly matured fruit, eaten at a fit time of the day, as to that which is unripe or eaten at night. Besides, the brandy or whisky drinker, with his swelled spleen and liver, is particularly slow to acknowledge injury from those liquors and their like, and particularly prone to attribute his malady, or its aggravation, to any cause but the true one.

Pumpkin.—In the same family as the melons, are found the pumpkin, squash or semlin, and cucumber. The alimentary use of the pumpkin (*Cucurbita Pepo*) is greater than of any of the cucurbitaceous family, both in the old and the new world. It has the advantage, in its firmer substance, of keeping for a length of time, and even forming part of winter stores in thrifty housewifery. In southern Poland, the Ukraine, and throughout southern Russia, Persia, and Armenia, the pumpkin and the melon, and also the cucumber, are eaten to an extent hardly thought of elsewhere. Niebuhr, the celebrated traveller in the

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East, says: "Of pumpkins and melons, several sorts grow naturally in the woods, and serve for feeding camels, but the proper melons are planted in the fields, where a great variety of them is to be found, and in such abundance, that the Arabians of all ranks use them for some part of the year as their principal article of food."

The red, or fruit proper of the pumpkin, divested of its rind, is prepared by boiling, and then, after admixture with sugar, baked and served up with pastry. Our friends in New England claim, we believe, to be the best *artistes* in the preparation of this dish, as they incontestibly are our exemplars in the large consumption of it. Mixed with a portion of apples similarly prepared, the flavour of the pumpkin pie is considerably improved.

The Cucumber (*Cucumis Sativus*) is eaten in very different fashions: the first, and the common one, is that adopted in northern Europe and in the United States, and consists in peeling the cucumber, yet in its green state, cutting it into thin slices, and eating it with salt, pepper, vinegar, &c. In this way the fresh juice is taken, together with a resisting fibro-pulpy substance, neither of which is friendly to a weak stomach, but, on the contrary, will prove very often noxious. When allowed to reach maturity, its texture being softened, and the juice correspondingly changed and milder, it is often eaten in slices by the rural part of our population, either with salt or pepper, or often without any addition. The second fashion, and that resorted to by the larger number of people in the south and east of Europe, and in Asia, consists in subjecting the cucumber, which is allowed to acquire its full growth, to some culinary process, by which it is rendered mild, soft and easy of

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digestion. The Tartar inhabitants of the Crimea, raise a large Turkish variety, which they fill with meat and rice, and eat of in abundance. The fruit of the egg plant is also dressed in the same way. There is yet another manner of preparing the cucumber, and also gourds, for food. They are allowed to ripen fully; are then gathered and cut into pieces, and still further dried in the sun or by artificial heat, and finally reduced by a kind of grinding, into a coarse meal: this is eaten with fat, oil or butter, and some condimental addition.

The cucumber has been extensively cultivated from the earliest periods, as well as most of the other species of gourd. When the Israelites complained to Moses in the wilderness, comparing their old Egyptian luxuries with the manna upon which they were fed, they exclaimed: "We remember the fish which we did eat in Egypt freely—the cucumbers and the melons." The cucumber of Syria was cultivated in large open fields, in which a hut was erected for the abode of the watchman, who guarded the fruit against foxes and jackals. On the western side of the Jordan, Burkhardt saw fields of cucumbers; and in India, beyond the Ganges, Bishop Heber saw a man in a small shed of bamboos and thatch, watching a field of cucumbers. He again observed a watcher of cucumbers, who lighted a fire during the night, to keep off the wild dogs and wolves from his fruit. (*Lib. Ent. Knowledge.—Timber, Trees and Fruit.*) We must suppose that the cucumbers were near maturity, when dogs and wolves were expected to make an attack on them. The instinct which warns against what is noxious, would keep even these animals away from green cucumbers.

The next tribe of fruit-bearing trees, of which I shall make brief mention, are the *Pomaceæ*.

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APPLE (*Pyrus Malus*).—The apple is the favourite fruit in the north, as the orange is in the south. It may, indeed, be designated as the fruit of the colder climates. It remains the longest in season, is used in the greatest number of ways, and, therefore, is the most generally cultivated. The useful qualities of the apple have extended its cultivation throughout Europe, as far as the 60th degree, north latitude. In America, it does not flourish as far north as this, but still it has a great geographical range, viz. from Maine to Tennessee. The American apples are among the finest in the world, and those from New York and New Jersey, are most prized. Those of England, and Normandy (France), are also of a superior kind.

The apple-tree, in common with our most esteemed cultivated fruits, is a native of the East. The chief varieties in England are probably derived from France, as most of the names are French, either pure or corrupted. The golden-pippin is, however, generally regarded as English. Catharine of Russia was so fond of this apple, that she was regularly supplied with it from England; and in order that she might have it in the greatest perfection, each apple was separately enveloped in silver paper before it was packed.

Apples intended to be kept for the winter, should remain on the trees until quite ripe, when they should be gathered in dry weather, and placed in a heap for five or six weeks, in order to sweat: they should then be carefully wiped dry, and those that are perfectly sound, packed in large jars or boxes, so as to be excluded from the air, which will keep them sound and plump, with a retention of their flavour. (*Phillips's Pomarium Britannicum*, p. 57.)

Apples are imported in considerable quantities into

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England, from the opposite shores of France, Normandy being famous for this fruit, and also from the United States. The average amount in this way, for three years, ending 1831, was 36,000 bushels a year. With suitable care, apples might be sent to southern Europe in exchange for its oranges. The chief apple growing counties in England, lie on each side the Bristol Channel; Worcester and Hereford to the north, and Somerset and Devon to the south. To these may be added Monmouth, Gloucester and Somerset. Mr. Marshall calculates the produce of four of these counties to be 30,000 hogsheads a year. The entire quantity of cider and perry made in England, is about 75,000 hogsheads or 4,725,000 gallons annually. The quantity of apples required to make a hogshead of cider, is from 24 to 30 bushels; and in a good year, an acre of orchard will produce somewhere about 600 bushels. This is an estimate of an English orchard's productiveness. I have not seen a similar statement of the capability in this way of an American one. The produce of the orchards is very fluctuating, and the growers seldom expect an abundant crop more than once in three years.

From an average of four years, ending in 1837, the annual export of apples from the United States, may be stated to amount to 19,462 barrels, valued at 35,886 dollars. Of this quantity, 3237 barrels were shipped for England, 6782 were sent to the British North American colonies, and 4280 to the island of Cuba. (*M'Culloch, Dict. Am. edit.*) The value of the products of the orchard in the United States, in 1840, was about eight millions of dollars; but what was the proportion of apples and of peaches, and how much in cider and brandy (apple and peach), I am not apprized. In France, the people drink no less than 8,848,218 hectolitres of

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cider, or upwards of 234,121,000 gallons, which, at 7 per cent. alcohol, (Mr. Brande makes it 9 for cider,) are equal to 32,777,908 gallons of common whisky or gin—a pretty good item this in the consumption of intoxicating drinks in France.

The apple, containing both malic and acetic acids, with some sugar, has a pleasant and refreshing flavour, and to persons in health, constitutes a useful addition to bread or other farinaceous food. It is inimical to the dyspeptic, the rheumatic, the gouty and those troubled with renal and cutaneous disorders: it is often a source of serious, sometimes fatal disease in children who have not masticated the fruit sufficiently, but swallowed it in pieces of some size. There are instances of portions of apple having been brought up again by eructation in the same state in which they had been swallowed two days previously. The words of Horace, *pomifero grave tempus auno,* are not then merely poetical. Subjected to various changes by roasting, baking and stewing, and the addition of sugar, apples acquire more nutritive value: and when eaten, as they often are, with milk or cream and bread, may be regarded as furnishing a meal equal to the subsequent requirements of active exercise if not of labour. Duduit tells us, that one-third part of boiled apple pulp, baked with two-thirds of flour, and properly fermented with yeast for twelve hours, makes a very good bread, full of eyes, and quite palatable and light. (*New Month. Mag.* June, 1821.) Of all pies, the apple has enjoyed the greatest reputation, except, perhaps, that of the pumpkin in New England; it is regarded with different eyes by the dyspeptic invalid, who rails at the apples, when in fact the pastry was the chief offensive, if not the offending substance. A medical writer has said, that "nothing is more light

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than good apple pie," but singularly qualifies his praise, by adding, "always excepting the crust and the hurtful addition, so usually made of stimulating spices, by way of seasoning what seems to require none." The aphorism might be expressed somewhat differently, in these words: Apple cooked is light and generally wholesome; apple-pie, precisely because it is a pie, is often oppressive to the stomach and injurious to the invalid.

Very pleasant confections are made of apples, called apple-butter and apple-jelly.

Pear, (*Pyrus Communis.*)—The pear-tree would seem to be of great antiquity: Homer describes it as forming part of the orchard of Laertes; and by the Athenians it was consecrated to Minerva before the olive. Pliny mentions several sorts of pears that were grown in Italy; and particularly mentions that a fermented liquor was formed of their juice. It is probable that the Romans brought the cultivated pear to England; and that, subsequently, the monks paid great attention to its varieties. Most of the finest kinds of pears, at present, are admitted to be of continental origin,—the horticulturists of France and the Netherlands having paid more attention to this species of fruit than was given to it in England.

The two most marked divisions of pears are the summer and the winter,—the former soft in texture and sweet; the latter less saccharine, but somewhat acerb and fibrous. Pears, if contrasted with apples, may be said to have more sugar and lignin and less acid in their composition than the latter fruit. They are not adapted to persons with weak digestion, nor to those of a phlegmatic constitution, nor to old persons. Baked pears with sugar make a pleasant dessert. The fermented juice of the pear, or perry, was in more repute

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in former times than at present. It is made of the crudest and hardest varieties of the fruit.

Quince, (*Pyrus Cydonia.*)—This fruit was originally from the island of Candia, (Crete.) The ancients held it in high estimation, considering it as the emblem of happiness, of love, and of fruitfulness: it was dedicated to Venus, and the temples of Cyprus and Paphos were decorated with it. Columella says, that quinces not only yield pleasure but health also. It is the opinion of some of the learned, that quinces were the golden apples of the Hesperides, and not oranges, as certain commentators assert. Notwithstanding these praises, he who attempts to eat the fruit just as it is gathered from the tree, will feel little inclined to join in them. But, on the other hand, when properly prepared, by boiling and simmering over a slow yet strong fire and mixture with sugar, quinces form one of the pleasantest conserves we have. An excellent marmelade is also made from this fruit: the term itself is derived from *marmelo*, the Portuguese name for the quince. In the south of France, particularly on the borders of the Garonne, this fruit is cultivated very extensively; and the peasants prepare from it a marmelade, which they call *catignac.* The mucilage of quince seeds is nutritive, demulcent and emollient. It is by Pereira (*Mat. Med.*, 1127) thought to be a peculiar principle, which he calls *cydonin.* The entire seed, if taken in large quantity, would, he suggests, act like bitter almonds, as they are said to yield hydrocyanic (prussic) acid. The mucilage is almost always employed, externally, as an emollient and sheathing application to cracked lips and nipples, to inflamed eyes, to certain painful tumours, &c. Hair-dressers use it as a cement for dressing the hair in braids.

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Belonging to the same natural family, viz., the *Rosaceæ* of Jussieu, both the fruits last spoken of, but of a different tribe, are the *Amygdaleæ*, under which are ranged the peach, the plum, the common almond, and common cherry.

Peach, (*Persica Vulgaris.*)—If any fruit in the United States can be called national from its abundance and general excellence of flavour, it is the peach. It unites the zones of the orange and the apple,—coming between and running into each of these, as we have seen maize to do between rice and wheat.

The classical and botanical name of the peach bespeaks its origin from Persia, whence it was brought by those universal conquerors and colonisers, the Romans, into Italy, and by them carried into France. Like so many of its good fruits and most esteemed vegetables, the peach dates its introduction into England about the middle of the sixteenth century. It is there chiefly a wall fruit. Much attention is paid to the cultivation of peach trees in the neighbourhood of Paris; and the peaches there are of excellent quality. The principal gardens for the supply of the French capital are at Montreuil, a village near Paris; and one tree sometimes covers sixty feet of wall, from the one extremity to the other. The Montreuil peaches are of the finest flavour; and their excellence is properly attributed to the exclusive attention of the people to their culture. The espalier peaches of the Duc de Praslin, near Melun, are stated to be the finest in Europe.—(*Timber Trees and Fruits.*)

The facility of raising the peach from the stone has probably tended to its general diffusion throughout the world. This fruit has steadily followed the progress of civilization; and man, "from China to Peru," has sur-

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rounded himself with the luxury of this, and of the other stone fruits, very soon after he has begun to taste the blessings of a civilized life. Such has been the profusion of peaches in some portions of our country, that the proprietors of orchards thought themselves obliged to convert a good share of the fruit into brandy in order to prevent waste. A better view of economy, connected with better ethics is, we believe, beginning to be taken on this point; and it will, we trust, ere long be generally admitted, that an improved system of planting and grafting, and close attention, will be rewarded by fruit of such a quality as will command a fair price at near markets, without the implied necessity of converting it into poison, and of deriving income from the vitiated appetites and the physical distresses and diseases, to say nothing of the moral degradation, of our fellow creatures.

The *flesh* of the peach is both palatable and nutritious, on account of its sugar, gum, &c., and, as medical men term it, slightly refrigerant from the free malic acid which it contains. Peaches and milk, with sugar, constitute a dessert which loses nothing of its relish and salubrity by its commonness in this country. Before they are yet ripe, some kinds of them, almost too coarse to be taken raw, are usefully stewed with sugar,—and for the day; or if the process be a little prolonged, the result is a fine preserve, which will answer for the next year. Peeled, stoned and sliced, peaches are dried in large quantities, and put aside for use during the ensuing winter and spring. Stewed with sugar, and eaten alone or with milk and bread, they make a diet which an invalid, merely on the score of taste, might be well content with. I have been told of an instance, in the Valley in Virginia, of a family having made enough, by selling the products of a peach orchard, and mainly dried peaches, to enable them to purchase an adjoining farm, of several hundred acres. Captain Head, in his "Rough Notes," mentions the beauty and productiveness of the peach-trees which are scattered over the grain-fields in the country between the Andes and the La Plata; and he notices, also, dried peaches as an article of food in the mountainous parts, to which, of course, they must be carried from the plains.

The two chief kinds of peaches are the *free* stone and the *cling* stone; from the former the flesh is easily detached,—to the latter it adheres closely.

But although the fruit is wholesome and nutritious, when ripe, and eaten within the bounds of moderation at a suitable time of the day, not night, the *kernels*, the *blossoms*, the *leaves*, and the *bark* of the peach-tree possess poisonous properties. All these parts have a peculiar yet pleasant bitterness, similar to that of bitter almond, and depending on the same principle, (prussic or hydrocyanic acid.) The leaves are sometimes employed in cooking and confectionary for imparting a flavour. This is not the place to speak of the medicinal application of the leaves, bark, &c.; but it is well to state, as a caution, that injurious and even fatal effects have resulted from the empirical and domestic prescription of some of them for the cure of particular diseases, such as worms.

Plum, (*Prunus Domestica*)—Prunes, (*Drupæ Siccatæ Pruni.*)—The varieties of the plum are numerous. In England, some of them are brought to a large size and fine flavour. In this country it is, as yet, generally an inferior fruit. At best, however, it is more grateful to the taste than wholesome,—and cannot at all compete with

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the peach. I introduce it here, with a view of noticing it in a dried state, when it acquires the name of *prune*.

Prunes are principally procured from Portugal and the south of France. The plums are dried in warm countries, by solar heat, on hurdles; but in colder climates, artificial heat is employed. In France, both methods are adopted; the fruit being exposed to the heat of an oven, and to that of the sun, on alternate days. *Table prunes* are prepared from the larger kinds of plum,—as the Saint Catharine and the Reine Claude (Green Gage): *Medicinal prunes* from the Saint Julien. The former have an agreeable, very sweet taste; the latter are somewhat austere. They are principally imported from Bordeaux. (Pereira, *Op. cit.*) The quantity imported into England, in 1832, was 6,285 cwt.

By drying, or even by baking for culinary purposes, the plum becomes salutary, and, in its former state especially, is taken with advantage by invalids of slow digestion. Stewed prunes is a favourite, and one of the few safe and useful domestic prescriptions.

Almond, (*Amygdalus Communis.*)—The almond was well known to the ancients; it is mentioned in the book of *Genesis*, (xliii. 11.) The fruit is not so attractive as that of the peach; because instead of presenting the same delicious pulp as the latter, the pericarp of the almond shrivels as the fruit ripens; and when the ripening is completed, it has become a horny kind of husk, which opens of its own accord. The kernel of the almond is sometimes defended by so thin a shell, that the nuts break when shaken together.

Almond *oil* is principally procured from the poisonous variety, or *bitter almond*. There is another constituent of almonds termed *Emulsin*, or the *vegetable albumen*

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of almonds. It is white and soluble in cold water, and hence it is a constituent of almond emulsion. This latter agrees in many of its properties with animal milk, with which it agrees in possessing nutritive and emollient qualities. Almond emulsion or *almond milk*, is made by beating ½ oz. of blanched almonds with ⅛ oz. of powdered gum arabic; ¼ white sugar, and adding water six ounces and a half, or about thirteen table-spoonsful. It is highly recommended in pulmonary affections, to appease cough and to allay irritation; and in inflammatory affections of the alimentary canal or of the renal apparatus. We should however regard it rather as a dietetic aid to active treatment, than as having itself any decided medicinal properties; and with this view I notice it in this place.

Sweet almonds are nutritive and demulcent; but on account of the quantity of oil which they contain, they are sometimes difficult of digestion, at least if taken in large quantities or by persons whose digestive powers are weak. When rancid, they are still more apt to disorder the stomach. The husk or skin (pellicle) of the almond has been known to occasion nausea, uneasiness in the alimentary passages, increased heat, œdematous swelling of the face, followed by urticaria or nettle rash. On this account, almonds for the table should always be blanched. Blanched and roasted, they have been used as a substitute for coffee.

CHERRY, (*Prunus Cerasus.*)—The cherry is a native of most temperate countries of the northern hemisphere. Though abundant, this fruit has not either the size or the flavour in this country which it so commonly has in England. This imperfect development gives additional effect to its naturally acid properties, and makes it an unwholesome fruit, especially when consumed in the

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quantities and in the unripe state in which it so commonly is among us. The skin ought to be rejected by those eating the fruit.

Several *liqueurs* are made from cherries; among the most esteemed of which is cherry-brandy or cherry-bounce, which in flavour is superior to that of most wines; and if alcoholic drinks were ever safe for daily use, this diluted with water would be entitled to the preference. But in the case of the cherry, as of all other fruits, let us enjoy with thankfulness their pleasant flavour and their often nutritive properties, without either adding to them a poison, or converting them into one. Man has 'devilish devices' enough to answer for without this remaining any longer on the list.

Of the pleasant genus *Ribes,* I have not room to say as much as their modest merits justify. They include the varieties of *Currant* and the gooseberry.

CURRANT, (*Ribes,*) was once regarded as the Corinthian grape degenerated. It is now more properly spoken of as indigenous to Great Britain, in many parts of which it is found growing naturally. There are three varieties, *white, red* and *black,* in common cultivation and use. The white having the most delicate flavour, is most in request for the dessert; the red is more used in the preparation of jellies. For pastry the currant is among the most valuable of British fruits, being easily preserved, and growing in sufficient abundance, on account of its hardiness, to offer a cheap luxury to the humblest classes. In parts of the country where it is the custom to train the currant against the walls of the house, its rich dark leaves, and its brilliant fruit, growing over the latticed window, offer almost as pleasing a picture as the vines of Italy. I transcribe this passage from the English work already cited, (*Timber Trees and*

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Fruits,) in the hope that it may incite more than one reader of these pages to imitate and prompt others to imitate this pleasant feature of English rural life. Our currants in the United States give a very faint idea of the size and fine flavour of those in England and Ireland. We have suitable soil and climate; and a better and more careful horticulture is all that is requisite to procure for us cherries, currants and gooseberries, equal to the English.

The berries of the black currant are larger than those of the red or the white, but they are not so juicy; and the crop upon a single bush is less abundant: they are supposed to have medicinal qualities, which do not belong to the other species of currants. They can be made into a very pleasant jelly, which, in rural pharmacy, is recommended in cases of sore throat.

GOOSEBERRY (*Ribes grossularia*) is a fruit much better adapted to cold than to warm climates. If not a native of Britain, it flourishes there, and of a size which would astonish persons who had never seen any other than our poor dwarf specimens in this country. Great pains are taken, in different parts of England, to excite a friendly rivalry in bringing the gooseberry to the greatest perfection. The gooseberry shows of Lancashire, Cheshire, Staffordshire, Warwickshire, and other manufacturing counties, are conducted with great system, and an annual account of them, forming a little volume, is printed and published at Manchester. The heaviest gooseberry which appears to have received a prize, was exhibited at the Shakspeare Tavern, Nantwitch, in 1825: it weighed 31 dwts. 16 grs. Gooseberries are of various colours,—white, yellow, green and red: the yellow have generally the richest flavour.

RASPBERRY, (*Rubus Ideus.*)—The red raspberry is

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indigenous to Great Britain, it being often found wild there. Its present flavour and estimation compared with those which it possessed towards the latter end of the sixteenth century, in that country, show the improvement which this fruit has undergone by cultivation. The larger kinds of raspberry, both red and yellow, were brought to England from the Netherlands. The latter is most admired as dessert; and it is a somewhat curious fact, that all the white fruits of the berry kind, are sweeter than the coloured, whereas, other fruits that are coloured are sweeter than the white. The red raspberry is considered the finest for flavouring ices, jams, &c. There is a third kind, which produces two crops a year; they answer best when the shrubs are mixed with the others.

The peculiar yet pleasant flavour of the raspberry, is quite evanescent. Even a few hours will diminish it; and if the berries be kept for two or three days, the flavour is almost entirely gone. Even on the bush, the flavour does not continue above two or three days after the fruit is ripe. A quantity of peat or bog earth greatly improves both the flavour and the size of the raspberry. New varieties may easily be obtained from the seed, the plants raised from which begin to bear the second year.

The raspberry is among the most wholesome of our summer fruits, and is adapted to nearly all ages and constitutions. It contributes to preserve a regular state of the bowels.

Strawberry, (*Fragaria Vesca*,) derives its name from the practice, once common, of putting straw round the plant. This fruit, by the extent of its growth, both in Europe and America, and the fine aroma and flavour which it possesses, has acquired a well merited

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reputation. In the western country, the wild strawberry is abundant and of excellent flavour; but those in our gardens do not exhibit either the size, variety or fine taste which they are susceptible of acquiring. Linnæus gave the strawberry a vogue among invalids as a remedy or prophylactic against gout, which the fruit does not deserve: its acidity is often prejudicial not only to the gouty, so called, but to the dyspeptic, and to young children who may be prone to intestinal disease.

With sugar and milk, strawberries make a good dessert; but, to be fully enjoyed, they ought to be eaten at the moment of their being gathered from the vine, when their aroma is greatest, and there is less risk of their running into the acetous fermentation than after they have been some time in the market, and perhaps another period in the house. The old scarlet strawberry, and the old pine or Carolina strawberry, both of them procured from North America, are the two varieties most prized at this time in Great Britain. The last is of a deep red on both sides, and it is the most highly flavoured and rich of all strawberries, constituting the most valuable variety that has yet been discovered. Strawberry jam is much esteemed; and the flavour communicated to ice cream, by the strawberry, is preferred to that of the raspberry or indeed of any other fruit.

Cranberry, (*Vaccinium Oxycoccus.*) This fruit, sometimes called red whortleberry, yields citric acid and astringency of the most grateful kind. With a suitable addition of sugar, and preparation by boiling and stewing, cranberries are used to a great extent in the United States, either with pastry, or as a sauce to meats, particularly turkey, or alone as a dessert. I know of no kind of preserves equal to cranberries for long voyages: they keep so well, and their acid flavour is so

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refreshing to a palate which has for its chief stimulus, under these circumstances, salt meat.

Cranberries are imported into England from Russia and North America.

TAMARIND, (*Tamarindus Indica.*)—The tamarind tree flourishes both in the East and West Indies. The fruit, or rather the tamarind pulp, as analysed by Vauquelin, yielded citric, malic and tartaric acids, with bitartrate of potassa, sugar, gum, and vegetable jelly, parenchyma and water.

Tamarinds are refreshing to the feverish patient, and at the same time medicinal. An infusion of tamarinds forms a very pleasant cooling drink, as does also tamarind whey.

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CHAPTER XI.

ANIMAL FOOD.

Proximate principles of animal matters—Fibrin—Albumen—Gelatin—Casein—Osmazome.—Milk, its products and preparations—Alimentary or primary staminal principles—The aqueous.—Water in all the fluids and solids of organized beings,—its universality and use in all the organs—Mixture of staminal principles necessary—Milk, a general aliment,—its composition in different animals—Causes affecting its quantity and quality—Milk the only proper food for infants—Its occasional mixture with farinaceous substances—Dietetic value of milk—Properties of good and bad milk—Additions to milk, for food—Butter,—its composition, preparation, and preservation—Quantity consumed in Great Britain and United States—Ghee, the butter in India—Dietetic value of butter—Cheese,—its preparation and varieties; large use of—When, and how proper for food.—Egg,—its composition, and nutritive properties,—consumption of, in London.

It will facilitate the acquisition of a knowledge of the nutritive properties of animal substances used for food, and at the same time aid us in classifying them, if, as was done in the case of vegetable food, I first indicate their chief proximate animal principles. These are *fibrin*, *albumen*, *gelatin*, *casein*, and *oil* or *fat;* some others will be more briefly noticed afterwards.

If we cut off an outside piece of raw meat from an animal recently killed, we will suppose it to be either an ox or a sheep, we see a red part or flesh proper, next

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fat, and then externally a thin, sometimes a shining part, which forms a kind of cover to the others. Now the first part or red flesh, the lean as it is also called, consists of fibrin chiefly, the next of animal oil, or fat, and the third of gelatin. But the separation is never so complete and distinct as might be inferred from this distinction, for if we cut out with the greatest care a piece of what we might call, at first, all lean or red flesh, a more attentive inspection, even with the naked eye, will show us layers of fine fat separating the interstices of lean, and each of these again connected more closely by a thin and delicate lamina or sheath, analogous in its nature to the thicker and outside covering of the whole piece. The inference from this second and more minute inspection is, that each piece of the lean of meat, however small, consists in reality of red part or fibrin proper, with an investment of membrane, which is gelatin and albumen, and a looser layer which is of fat or animal oil. This premised, the reader will follow me with more satisfaction in a brief description of the several proximate animal principles and the means of procuring them pure, as well as the parts of the animal in which they are most abundant.

Fibrin. This principle enters into the composition of blood besides being the basis of muscular flesh. The red colour in both these substances is adventitious. If we stir freshly drawn blood briskly with a rod or birch, the fibrin coagulates slowly into colourless fibres which adhere to the rod, while the rest of the blood remains fluid with the red globules or colouring portion floating in it. By washing in cold water, the adhering fibres are still farther whitened and purified, and are then simple fibrin. If we take the clot of blood which separates from the more fluid part, after it is drawn from a vein

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and cooled in a vessel, and wash it repeatedly in the hand, there will remain a twisted white cord-like substance which is fibrin. Slices of lean beef subjected to soaking in repeated portions of warm water will also exhibit a residue which is fibrin, with, however, minute adherent particles of fat and membrane. Digested in concentrated nitric acid, fibrin swells and becomes a bulky tremulous jelly, which dissolves completely in a considerable quantity of hot water. Alcohol converts it into a fatty matter.

Albumen. This animal principle exists in the serum, as it is called, or saline and watery part of the blood; also in the skin and lower tissue beneath it, and which mixed with fat surrounds the lean of beef. It is divided into two varieties, liquid and solid. Liquid albumen is best procured from the white of eggs, which consists almost solely of this principle. In this state it is a thick glairy fluid, insipid, inodorous, and easily miscible with cold water. Liquid albumen is coagulated by heat, alcohol, and the stronger acids. The character of being coagulated by hot water distinguishes albumen from all other animal fluids.

Albumen is of great use in clarifying syrups, as by entangling in its substance all the fecula and foreign particles, it carries them with it to the surface or falls to the bottom of the liquid. Albumen is both an excellent test and the best antidote for corrosive sublimate.

Gelatin. This principle is not found in the animal fluids in health, but it exists in large proportion in the tendons, cartilage or gristle, bones, and the membranes which invest the limbs and the muscles separately, as also in the loose filamentous tissue under the skin and between the muscles, and which is interwoven with the fat. It has been made a question by Berzelius and

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others, whether gelatin is really a principle in animal tissues, or is not formed by boiling; for it is by this process that the parts already mentioned are converted into gelatin with the properties under which it is recognised and described. These are, its ready solubility in boiling water, and the solution forming a bulky semi-transparent, tremulous jelly as it cools, which is again soluble in boiling water, by which it is distinguishable from albumen and fibrin. Its tendency to form a jelly is such, that one part of gelatin, dissolved in a hundred parts of water, becomes a tremulous solid on cooling. Isinglass, which is the purest variety of gelatin, is prepared from the sounds of the genus *acipenser*, especially from the sturgeon. The animal jelly of the confectioners is made from calves' feet, the tendinous and ligamentous parts of which yield a large quantity of gelatin. The common gelatin of commerce is the well known cement called *glue*, which is prepared by boiling in water the cuttings of parchment, or the skins, ears, and hoofs of animals, and evaporating the solution.

The gelatin of bones may be obtained by the solvent power of water when exalted by heat and pressure, as in the celebrated digester of Papin. Gelatin is the principal ingredient in soup. Hence, by evaporation, soup may be reduced to the consistence of a glue, which, if osmazome be present, comprises, within a very small space, the materials for regenerating, with the aid of hot water, the soup from which it was obtained. In the indurated state, gelatin has been sold under the name of portable soup: but as we shall see hereafter, gelatin alone requires additions to make it nutritive and palatable.

The precipitation of gelatin by tannin and its fixation in a permanently solid state, give rise to the process of

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tanning leather, and rendering it fit for shoes, boots, and numerous other purposes.

CASEIN or CASEUM. This is the chief or rather the most animalizing principle in milk. It is the curd obtained from milk by the rennet, and separated from the whey by washing with cold water. In this state it is a white, insipid, inodorous substance, insoluble in water, but readily soluble in the alkalies, especially in ammonia. By alcohol it is converted, like fibrin and albumen, into an adipocerous substance of a fetid odour, and like these two principles, it may be dissolved by a sufficient quantity of acetic acid. Casein, in its coagulated state, is generally combined with some foreign substance, as salt, or an acid. Soluble casein may generally be obtained from curd spontaneously formed as milk becomes sour, in which state it is combined with acetic acid, by washing the curd and neutralizing the acid with potassa. I omit the further particulars of the process, by which the casein is obtained pure and evaporated to dryness: in this state it forms a diaphanous mass, which strongly resembles gum arabic, may be long preserved without change, and still retains its solubility in water.

In solution, flavoured with sugar and aromatics, casein may be serviceable to invalids and convalescents as an article of food. It may be taken in its dry state on long voyages; forming with water, butter, and sugar, an excellent substitute for milk.

Casein, when kept in a moist state, undergoes a species of fermentation precisely analogous to that experienced by gluten under the same circumstances. So close is the resemblance in some respects, that it has been employed, as I have already stated in page 139, in the manufacture of bread with potato starch and wheat flour. Casein is the basis and constitutes the chief bulk

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of cheese, to which it imparts by a kind of fermentation a peculiar taste in old cheese admired by epicures.

Having detailed the characteristics of the three chief proximate animal principles, and which with fat make up nearly the entire substance of an animal, it is proper to add that recent experiments make it very probable, if not absolutely certain, that fibrin and albumen are but modifications of the same principle, as they are convertible into one another, and both have the closest analogy to casein, so that for general purposes it would almost suffice to speak of them as one animal principle, designating them, as Prout has done, by the term *albuminous*. They all have nitrogen or azote in their composition, and impart emphatically the peculiar properties of animal matter for the purposes of nutrition.

It is worthy of remark in this place, that the line of difference is not so clearly drawn between animal and vegetable substances used for food, as would at first appear. The resemblance of gluten to casein has been already mentioned, and inferentially that of the former to fibrin and albumen may be admitted. Gelatin furnishes a sugar resembling the sugar of grapes, and by this conversion shows an analogy to starch, which, as we have seen, is convertible in such large proportion into sugar. Between vegetable albumen and animal albumen, the resemblance has been already noticed. Lactic, an animal acid, is by many chemists regarded as a modification merely of the acetic. Fixed vegetable and animal oils approximate also in many particulars. Both of them consist of two elements, stearine and elaine; both form soap, and both of them are wanting in azote. Milk yields sugar, which resembles that from vegetables, except in its not fermenting.

Osmazome. This is the flavouring element of animal

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flesh, and abounds most in that which is red and belongs to older animals. The higher flavour of broths made of beef or mutton than those of veal and lamb is due to the presence of osmazome in the former, in addition to the gelatin which predominates in the latter. This element dissolved in water constitutes the proper and relishing gravy of meat, and must not be confounded with the melted fat which is passed off as such by bad cooks. Osmazome is regarded as the most stimulating element of animal matter, and it has been compared to the aromatic or spices among vegetable substances. A nutritious powder or paste may be prepared as follows: dry osmazome, 1 oz.; dry gelatin, 4 oz.; gum arabic, ½; cloves and ground pepper, celery twigs, carrot seeds, of each twelve grains. By adding salt to this powder, it can readily be made into a pleasant and nourishing soup.

As reference has been made already to one of the chief elements of milk, I may as well at once describe its other ones, and then the reader will be prepared to follow me without confusion in my subsequent remarks on the relative value in an alimentary point of view of the chief animal substances used for human food. The principal products and preparations of milk, at least for dietetic and medicinal purposes, are cream, butter, curds, cheese, and whey. When milk is left at rest, there is a collection formed on the surface which is called cream, and which consists principally of fatty or butyraceous matter. If milk without prior change be subjected to continual agitation, the fatty globules coalesce and form butter; and when this is removed, the fluid part merely of the milk remains. Agitation of the cream alone gives a larger proportion of butter. This fluid part or whey, holds in solution the other remaining components of milk,

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viz:—the casein, the sugar of milk, and the salts. Casein, separated in the manner already mentioned, leaves a sweetish fluid with a small proportion of saline matter or simple whey. Curd made from unskimmed milk entangles with it a certain quantity of the oily globules or butter, and in this state it furnishes a richer cheese than if it be made after the separation of the cream. In the first case casein is mixed with a butyraceous matter, and is oily and of high flavour; in the latter, it is harder, and has, unless very old, less distinctive taste. The fluid remaining after the separation of the butter by churning, and hence called butter-milk, may be called a whey, with particles of butter and casein mixed with it. If allowed to remain for a time, and especially in a somewhat elevated temperature, it becomes acid by the evolution of acetic acid and of an animal acid called lactic, both of which give rise to sourness of the butter-milk.

Cow's milk, from which the cream had been removed, was found by Berzelius to consist, in 100 parts, of 2.60 of casein, with a portion of fatty matter; 3.50 of sugar of milk, with some earthy and saline matters; water 92. The proportion of butter varies from three to four and a half per cent.

It was, after observing that milk was composed of three chief ingredients, viz. saccharine, oily, and curdy or albuminous, that Dr. Prout was led gradually to the conclusion, that all the alimentary matters employed by man and the more perfect animals, might in fact be reduced to the same three general heads. He has subsequently extended this view, which, as expressive of really a natural arrangement, merits the favour that it receives from his contemporaries. Regarding fibrin and casein, and also gluten, as modifications of albumen, and gelatin as a low mode of animalization, he ranks them in the *albuminous* division. Vegetable and animal oils, including butter, constitute the *oily;* and the *saccharine* or *amylaceous* group, include a great number and variety of vegetable substances as the cerealia, leguminosæ, &c., the proximate principles of which are sugar and starch. There is yet another of what Dr. Prout calls the *alimentary proximate* or *primary staminal principles*, viz. the *aqueous.*

Water, this writer truely observes, constitutes not only the medium in which most organic operations are performed, but its elements, either as water or separately, enter into the composition of every living organized being. The subject of water, therefore, in a physiological point of view, may be considered under two heads; as the medium on, or by means of which, all organic operations are performed, and as an alimentary principle.

The proportion of water entering into the composition of organized beings is so remarkable, as to appear almost incredible. Not only does the blood contain four-fifths of its weight in water, but even the parts of the body termed *solids,* that is the muscular mass or flesh of which animals chiefly consist, contain in reality only about one-fourth of solid matter. According to an elaborate analysis of Berzelius, the muscle of an animal contains 77 per cent. of water, and 23 per cent. of other matters or solids proper. We have already seen the large proportions of water in esculent roots, such as the potato, the beet, &c. As a farther illustration, we may mention a fact stated by Blumenbach, that a perfectly dry mummy of an adult Guanche, (one of the original inhabitants of Teneriffe,) with all the muscles and vis-

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cera entire, did not exceed seven pounds and a half in weight.

The water thus constituting a large portion of living animal bodies, is the medium by which all vital agencies are performed. In the blood, for instance, the solid, organized vital agencies are transported from one place to another; are arranged in the place desired; and are again finally removed and expelled from the body, chiefly by the agency of the water present. Water imparts, also, to the more solid constituents of the frame that peculiar flexibility and power of extension so characteristic of animal solids. The quantity of water they possess is continually changed by the operation of organic bodies. The lungs, the skin, the act of drinking, the kidneys, all affect it. In fine, water and its elements enter into all organic processes.

Dr. Prout contends, and in the main successfully, that a mixture of two, at least, if not of three, of the staminal principles is necessary to form an alimentary compound well adapted to man's use. "The composition of the substances by which animals are usually nourished, favours the mixture of the primary staminal alimentary principles; since most of these substances are compounds, of at least two of the staminal principles. Thus, most of the gramineous and herbaceous matters contain the saccharine or amylaceous, and the glutinous principles; while every part of an animal contains at least albumen (assuming here its general identity with fibrin), and oil. Perhaps, therefore, it is impossible to name a substance constituting the food of the more perfect animals, which is not essentially a natural compound of at least two, if not all the three great principles of aliment. But it is in the artificial food of man that we see this great principle of mixture

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strongly exemplified. He, dissatisfied with the spontaneous productions of nature, culls from every source; and by the force of his reason, or rather of his instinct, forms in every possible manner, and under every disguise, the same great alimentary compound. This, after all his cooking and his art, how much soever he may be disinclined to believe it, is the sole object of his labour; and the more nearly his results approach to this object, the more nearly do they approach perfection. Even in the utmost refinements of luxury, and in his choicest delicacies, the same great principle is attended to; and his sugar and flour, his eggs and butter, in all their various forms and combinations, are nothing more or less than disguised imitations of the great alimentary prototype, *milk*, as furnished to him by nature." (*Prout's Chemistry, Meteorology, and the Function of Digestion:* Amer. edit. p. 234.)

In milk we find illustrations of the four great staminal principles, viz. the aqueous (as water) constituting nearly 90 per cent. of milk, the saccharine (sugar of milk), the oily (butter), and the albuminous (casein).

I shall devote a few paragraphs to a notice of the use by man of this widely-diffused aliment. Milk is the chief animal principle added to his other food, by the Laplander within the Polar circle, and the Arab in the burning deserts of the South,—by the Tartar on the bleak table-land and Steppes of Asia, and by a no small proportion of the inhabitants of the chief countries in Europe. The reindeer supplies milk to the Laplander—who, on emergencies, eats of its flesh also; the Tartar obtains this nutriment from his mares, and the Arabs from their camels, their sheep, sometimes from their goats. The Yezeedes, a Turkoman tribe, living chiefly by themselves in the mountains of Singar, who pasture their camels upon the Southern desert, feed chiefly upon the milk, and sometimes upon the raw flesh of these animals. Of like fashion was the mode of living of the Numidians, described by Purchas, when he quaintly tells us, "their food is oftentimes patience with an empty belly, which when they fill, bread or meat after any sort, is absent. Only they have their camels' milk, whereof they drink a dishful next their heart."

The number of cows kept in London and its environs, is 9,000, and their annual produce 28,000,000 quarts of milk, valued at 720,000*l.* sterling.

Before proceeding to speak any farther of milk and its products, as aliment, it will be well to introduce the following tabular view of the several elements already described, as found in the milk of different animals. The analysis is made by MM. O. Henry and Chevallier.

	MILK OF THE				
Constituents.	Cow,	Ass,	Woman,	Goat,	Ewe.
Casein,	4.48	1.82	1.52	4.02	4.50
Butter,	3.13	0.11	3.55	3.32	4.20
Sugar of milk,	4.77	6.08	6.50	5.28	5.00
Various salts,	0.60	0.34	0.45	0.58	0.68
Water,	87.02	91.65	87.98	86.80	85.62
Total,	100.00	100.00	100.00	100.00	100.00
Solid substances,	12.98	8.35	13.00	13.20	14.38

The quantity of nutritive matter contained in milk, varies not only with the species, but with the individual, nay, with the same individual under different circumstances. The quality of human milk is affected by constitution, age, food, period after parturition, mental emotion, disease, the use of medicine, &c. Respecting the kind of diet suitable to nurses, Dr. Cullen make this emphatic declaration: "I allege it to be a matter of experience, that supposing the quantity of liquid to be the same, nurses living entirely, or for the greater part, upon vegetable aliment, afford a greater quantity of milk, and of a more proper quality, than nurses living upon much animal food. This I venture to assert from the observations of fifty years."

In order that good and pure milk be procured from the cow, the animal ought to be allowed a free range in the open air for at least a part of every day. The modifying influence of the food on the milk is shown in the better quality of this liquid in the spring and summer than in winter, and in its flavour, as well as that of the butter, being sensibly affected by the cow eating certain articles, such as wild onion, &c. We should infer from these facts, even if direct proof were wanting, that the milk of the mother will be considerably modified in its qualities by articles, both of food and medicine, which she herself has used, and that the infant at her breast will be affected in consequence. "We can modify the *colour* of the milk by mixing saffron or madder with the food; the odour may be affected by various cruciferous and alliaceous plants; the taste may be altered by the use of bitters, as wormwood; and lastly, the *medicinal effect* may also be influenced." Drastic purgatives and opiates, respectively, taken by the nurse, will produce their characteristic effects on the child. Whatever modifies the secretion of milk, either by unduly exciting, as by gross stimulating food, or altering the quality of this liquid by distilled or fermented liquors of any kind, will injuriously affect the child. It is a common, but a most pernicious belief, that the habitual use of malt liquors, for example, will increase the flow of milk, and keep up the strength of the nursing mother. So far from this being the case, her digestion will be impaired, she will be feverish,

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and her milk neither as good nor abundant as if she made water her sole drink. The child suffers in consequence. Thousands of children, says Mr. Courtenay, are cut off by convulsions, from the effects of these beverages on the mother.* Mental emotions also affect the quality of the milk; and the child's bowels are often disordered in consequence. The probability of diseased states of the system of the parent rendering the milk unhealthy, is so well and briefly set forth by Mr. Pereira, (*Mat. Med.* p. 1407,) that I shall use his language on the occasion. "Labillardière (*Dict. Mat. Med.* IV. 23) states, that the milk of a cow affected with a kind of tuberculous phthisis (*pommelière*) contained seven times more phosphate of lime than usual. Dupuy (quoted by Andral, *Treat. on Pathol. Anat.;* by Townshend & West, Vol. I. p. 675) also speaks of the large quantity of calcareous matter in the milk of cows, in whose lungs abundant deposits of the same substance were found. Other morbid changes have been observed by Donné, Robiquet and Lassaigne, and have been already alluded to. Now these are facts of the greatest moment, not only in reference to the frequency of disease in cows, and, therefore, to the possible morbific character of their milk, but it is of considerable importance in reference to the milk of the human subject. I think with this statement before us, it is highly improper to allow a female, with any trace or suspicion of tuberculous disease, to suckle. Not that a few grains, more or less, of phosphate of lime in the milk, can probably do any injury to the child, but the fact once established, that the milk may be thus altered by disease, leads to the suspicion that some

* See on this point a note by the author of the present work in Dr. Combe's work on Infancy, p. 161–2.

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other substances, not recognized by the physical or chemical characters, may be in the milk of diseased nurses, and may have an injurious influence on the child; and the suspicion does not confine itself to those affected with tuberculous diseases,—other hereditary or constitutional affections may also be attended with altered conditions of the milk. This suspicion is strengthened by the common observation, that the milk of any nurses will not equally suit children. A child quite healthy and in good condition, will sometimes, without any evident cause, fall off, and get into what is commonly called a bad condition, apparently from a change in the nurse. I am aware, that we cannot always refer this to any positively hurtful matter in milk. The quantity of nutritive matter in the same quantity of milk of two nurses may be very different: according to Payen, (*Journ. de Chim. Med.* Vol. IV. p. 118,) milk, with too much nutritive matter in it may disagree with the child. Another point worthy of attention, is the quantity of milk yielded in a given time. Payen says it varies in different women as much as from one to ten and a half."

It hardly requires the testimony of medical authority or of philosophy of any kind, in favour of milk being regarded as the natural nutriment of the young of all the mammalia, including our own species; yet certain prejudices, under the garb of shallow science, not unfrequently interfere to prevent a result to which the emotions both of mother and offspring would of themselves inevitably tend. Under the most opposite pleas, foreign additions are made to the maternal supply: at one time the infant is said to be so feeble and puny as to require more nutriment than the mother can give it in the form of her own milk; at another time, it is alleged that the child

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is so strong and large, and sucks so greedily, that she cannot supply its cravings. For the first three months after birth, a child wants and ought to have no other food than that of its mother's or a healthy nurse's milk; for the following six months, the most that is required is a very small quantity of some farinaceous powder, either of wheat flour or of arrow-root, or tapioca, &c. boiled with sugar into a thin jelly, to which, if the supply from the breast is irregular or at all deficient, some fresh cow's milk should be added. During all the period mentioned, farinaceous food, with cow's milk, ought to be regarded as a substitute for the occasional defective supply of the mother's milk, but never as a necessary addition to this latter when it is secreted in regular and adequately full supply.

Even after the teeth appear, the food of children ought not to be more of an animal nature than is furnished in the elements of milk itself. These teeth are not the natural index of requirements for animal food, so much as of ability to masticate a greater variety of farinaceous and other vegetable substances, including a moderate allowance of ripe fruit.

A great number of persons seem to have no idea of any article being really substantial and nutritive food, unless it be in a solid state; and hence milk is by them regarded more as drink than aliment. A slight glance at the analysis of milk ought to suffice for the removal of this error, and to show that milk is neither intended to be a drink after a meat repast, nor a preliminary for more substantial viands. It is a very healthful practice, in general, to breakfast on milk with bread in some form, less so to take butter with the bread, for then two portions of this animal oil are taken,—one free, and one combined with other elements in the milk. But a breakfast of this nature does not entitle a person to eat a

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heartier dinner of meat than his companion or friend who merely took coffee or tea and bread and butter for his morning repast. The reverse should be the practice. I have seen invalids who, having been probably directed by their physicians, to take milk daily, with the intention, doubtless, in the mind of the adviser, that it should be the chief aliment, act as if the drinking of a bowl of milk was but a whetter, a medicinal introduction to partaking of all the varieties of meat at table. In such instances as these, the sick man, instead of eating, as he obviously ought, less than those in full health, eats a great deal more than them, of the strongest animal food, and which would be far beyond the appetite and natural requirements of a ploughman or a pavior.

In nearly all chronic maladies, such as pulmonary consumption, gout, dyspepsia, and certain anomalous diseases of females, in which a regulated regimen ought to be persevered in for a length of time, milk is entitled to a preference as the nutrive basis of the aliment prescribed on these occasions. Sometimes it disagrees with the stomach, on account of its butyraceous or oily principle, and then buttermilk will answer a good purpose. According to the indications in other respects, this latter will be taken either soon after the churning, or after a longer period, when it is decidedly sour. If obtainable, asses' milk, in which the proportion of oily matter is smaller and of sugar greater, is better suited to the invalid, whose stomach is irritable. We find, in some cases, in which milk alone disorders the bowels, and causes pain and flatulence, that the addition of a very little farinaceous powder, as of arrow-root or ground rice, to the milk, obviates these disagreeable effects. If the coldness of milk be inconvenient to some stomachs, the addition of a little hot water removes this objection, and

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besides prepares it better, in common, than boiling,—a process often recommended for making it lighter for digestion.

When it is desired to substitute a milk aliment for the supply from the breast, when this is very deficient or entirely arrested, and when circumstances prevent the procuring another nurse, fresh cow's milk, diluted with a third part of hot water, and a portion of loaf sugar dissolved in it, will answer a very good purpose. The whey, or watery part of the milk after the removal of the curd, makes a salutary and, if it be slightly acidulated, or the milk have been turned with buttermilk, making the two-milk whey, as it is called, a very refreshing beverage in slight cases of fever, or convalescence from diseases in general.

A very limited quantity of milk will suffice, in the way of animal food, for the presevation of health, if an adequate amount of wholesome farinaceous substance be furnished at the same time.

In all cases in which milk is used,—either as a part of the daily food of the healthy, or dietetically for the invalid,—this liquid ought to be fresh and pure, procured from healthy and well fed and exercised cows. "Good milk should be quite liquid and homogeneous, not viscid; and should contain only spherical transparent globules, soluble in alkalies and ether; should not become thick when mixed with ammonia, and should form a floculent precipitate by acetic acid, but not be coagulated by heat. The relative quantity of cream afforded by milk, is estimated by a graduated glass tube, called a *lactometer.* The changes produced in the quality of the milk, by diseased condition of the cows, has recently attracted considerable attention in Paris, owing to the prevalence of a malady called the *cocote,* among

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the cows in that capital. In New-York, a somewhat similar state of things was indicated, in detail, a few years ago, in the public papers; depending, as was alleged, and generally believed, on the cow's being fed with distillery slops. "The following are the essential morbid changes which have been reckoned in milk: want of homogeneousness, imperfect mobility or liquidity, capability of becoming thick or viscid, on the addition of ammonia, and presenting, when examined by the microscope, certain globules (agglutinated, tuberculated or mulberry-like, mucous or pus globules,) not found in milk."

If a milk aliment of a more nutritive kind be required than this liquid alone, it will be well to mix it with a decoction of some of the more reduced or less stimulating animal substances, such as a decoction of hartshorn shavings, or veal or chicken broth, from which every portion of the fat has been carefully removed. Shavings of isinglass, boiled into a jelly, with milk, constitute an aliment of the same nature, with the recommendation of greater simplicity and purity.

It is worthy of remark, for the benefit of certain invalids with whom milk disagrees, that they will sometimes find cream sit better on their stomach. To give it a full trial, butter ought to be abstained from at the meal in which cream is taken with bread or other farinaceous matters.

Butter, generally spoken of as one of the constituents and proximate principles of milk, consists, itself, of three fatty bodies, *stearine*, *elaine* and *butyrine*. The latter substance yields three odorous fatty acids, viz. *butyric*, *capric* and *caproic acids*. A small quantity of these acids exists in ordinary butter, especially when it has been exposed to the air, and imparts to it its peculiar odour. Milk-butter is not so rich as cream-butter, but

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will keep much longer sweet: when churned, as is usual in large dairies, in a barrel-churn, it is still poorer, but its quantity is increased sometimes double, as the milk is left quite exhausted.

For the purpose of preserving butter, it is usually salted and packed in barrels. The proportion of salt is generally an ounce to a pound of butter. The following experiment is worth recording here. Thirty pounds of Lancashire butter, well salted with a double allowance of salt, were put into two mugs, and each covered with a pint and a half of brine. After keeping them in a cool cellar for thirteen months, they were examined, and found to be perfectly good; two years and five weeks having elapsed, the mugs were broken by an accident, and the butter being found to be perfectly good, the salt was washed out, and the butter sold for fresh butter in the Liverpool market. For exportation to hot climates, butter ought to be clarified before it is salted. For this purpose it is put into a lipped vessel, and placed in another of water, which is to be gradually heated until the butter is melted. It is to be kept melted for some time, to allow its albuminous or caseous particles to settle; the clear melted butter is then to be poured off from the dregs, and when sufficiently cooled it is salted. This clarified butter is paler than the fresh, and it acquires nearly the consistence of tallow. Butter is sometimes preserved with honey as a delicacy. It is first clarified, and being poured off from the dregs, an ounce of firm honey is added to each pound of butter, and well mixed with it. This mixture will keep for years without becoming rancid.

The production and consumption of butter are very great, as might be inferred from the countries in which animals are kept, and more or less domesticated with a

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view to procure their milk. The consumption in London is estimated by Mr. McCulloch, to be 16,830 tons, 37,700,000 lbs., being at the rate of half a pound a week, or 26 lbs. a year, for each individual, supposing the population to be 1,450,000. If to this be added 4000 tons for the victualling of ships, and for other purposes, the total, in round numbers, will be 21,000 tons, or 47,040,000 lbs., which, at tenpence per pound, would be worth 1,960,000*l.* The average produce per cow of the butter dairies, is estimated by Mr. Marshall, at 168 pounds a year; so that supposing we are nearly right in the above estimates, about 280,000 cows will be required to produce an adequate supply of butter for the London market.

Butter forms a prominent article in the export trade of Ireland. Some of the best Irish butter brought to London, after being washed and repacked, is sold as Dorsetshire and Cambridge butter. The quantity imported into Great Britain from Ireland, is little short of 500,000 cwt., and from foreign parts about 131,000 cwt., of which Holland and Belgium furnish 92,000 cwt. The salt butter of Holland is superior to that of any other country.

During a period of four years, upwards of 600,000 pounds of butter have been, on an average, exported annually from the United States, mostly to the West Indies and South America. The best butter that is put up, so as to keep for a considerable time, is that of Goshen, in New York. The *fresh* butter brought to the Philadelphia market, has the character of being as good as any other of the same description. (*McCulloch, Com. Dict. Am. edit.*)

In hot countries, butter is generally liquid. In India it is denominated *ghee*, and is mostly prepared from the

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milk of buffaloes: it is usually conveyed in duppers or bottles made of hide, each of which contains from ten to forty gallons. Ghee is an article of considerable commercial importance in many parts of India. It is said to be prepared from coagulated acid milk, which is often kept two or three days, by which time it is highly rancid. Mention has been made already of the excessive fondness of the Arabs for butter; and of their common fashion of drinking every morning a coffee cupful of melted butter, or ghee. On the score of nutrimental value and preparation for bodily labour and fatiguing march, this national allowance argues a much higher civilization than the early dram, by whatever odd or pleasing name called, still too common in European and American communities.

The dietetic utility of butter will depend very much on the quantity of other animal matter taken at the same meal, or on the same day with it. But if eaten with good bread, neither hot nor too fresh, or other farinaceous substances, including the leguminous, and if these aliments make up either the entire meal or the greater part of it, then is butter wholesome. When added to meats, or taken with abundance of milk, it is less apt to agree with those whose exercise is limited. It is more difficultly incorporated with farinaceous or other vegetable food than the fibrinous or albuminous or gelatinous part of animal substances; and it is more apt to offer resistance on being converted into good chyme than these. Hence we see why pastry is a bad food.

Cheese, another product of milk, being the curd separated from the whey, and pressed or hardened, has been used as an article of food from the earliest ages. Vast quantities of it are consumed in great Britain, and in most countries in Europe. England is particularly

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celebrated for the abundance and excellence of its cheese. From one county (Warwick), no less than 20,000 tons are sent annually to the London market, besides a very large supply to Birmingham. Large quantities of very good cheese are produced in Holland. In the manufacture of Gonda cheese, which is reckoned the best made in Holland, muriatic (hydrochloric) acid is used instead of rennet in curdling the milk. This renders it pungent and preserves it from mites. Parmesan cheese, so called from Parma, in Italy, where it is manufactured, is merely a *skim-milk* cheese, which owes its rich flavour to the fine herbage of the meadows along the Po, where the cows feed. The best Parmesan cheese is kept for three or four years, and none is ever carried to market till it be at least six months old. Swiss cheese, particularly that denominated Gruyère, from the bailiwick of that name in the canton of Fribourg, is very celebrated. Gruyère cheeses are made of skimmed milk, and are flavoured with herbs. (*M'Culloch, Com. Dict.*) There is scarcely a district in France which has not its kind of cheese. Those most noted are the Neufchatel, the Sassenage, the Roquefort, and the Guise. In Liguria (Genoese territory), the cheese made of ewes' milk is preferred. The Laplanders make a sort of cheese of the milk of the reindeer.

According to Mr. Marshall, the average yearly produce of cheese from the milk of a cow, in England, is from three to four cwt. or more than double the weight of the butter. The imports of cheese, in 1831, into England, amounted to 134,459 cwt., almost the whole of which came from Holland and Belgium.

In the United States, the quantity of cheese made is considerable, particularly in the northern and eastern states. The export of this article, mainly to the West

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Indies and to British North America, has amounted to $650,000, (*Comm. Dict. Am. edit.*); although in 1840 the entire amount of both butter and cheese exported was only $210,750.

There is hardly any alimentary substance, on the dietetic value and digestibility of which so much contrariety of opinion has been expressed, as in respect to cheese. The question has been mainly discussed, however, by overfed citizens, dyspeptics, epicures and dyspepsia doctors. Large masses of mankind have eaten largely, from the earliest times, of cheese, and have made it their chief animal nutriment, without any doubts as to its being wholesome, and certainly with no gastric uneasiness or laborious digestion in consequence. The weight of medical testimony, at least of city doctors, from Celsus to Gregory, is adverse to the salubrity of cheese as a condiment, or kind of dessert after dinner, or for supper; and they are right, considering the class whom they address—persons leading a civic life, who eat an abundance of meat, and who take inadequate exercise in the open air. It certainly is a great fallacy to believe that a person after he has eaten to repletion of substantial viands of all kinds, including a large proportion of boiled, roast and fried meats, can eat cheese with any advantage, or if at all, with any impunity. The practice would only be paralleled by his nibbling instead at the white of egg, hard boiled, with a little butter, or a thin slice of highly seasoned and dried beef or venison. Cheese after dinner, is a new dinner after the first. Cheese, and especially toasted cheese, is albuminous food with oil; for cheese consists of casein and butter, when it is made of cream, and even when made of unskimmed milk, it still contains some butyraceous matter. Now, food of this kind for supper, and before the hearty din-

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ner of a few hours preceding has been digested, is too much for a common stomach; and either it will show its uneasiness by pain, spasm, or feeling of weight at the epigastrium, or there will follow headache, or stricture across the chest, and other disagreeable effects connected with the latter stage of digestion. If a person of a gouty habit sup on cheese, he will not be surprised at an attack of gout in consequence of this indulgence. But all this does not prove cheese to be unwholesome, but only that the time is ill chosen for it to be eaten. Let the citizen, like the ploughman, breakfast or even dine on bread and cheese, and he will have small cause of complaint. If he have any fears about the cheese being insoluble in his stomach, he may as well be apprised that vinegar is a solvent of this substance, but that alcohol and its combinations are not. This reminds me of the fact, that cheese and butter which have been salted, suit many stomachs better than the fresh articles.

Egg.—The egg is another animal product, which is largely and extensively used for the food of man. The relative weight of the different parts of the egg are, according to Dr. Prout, as follows: *shell and membrane*, (in a thousand parts) 106.9; *albumen* or *white*, 604.2; *yelk*, 288.9.

The *white* or *glaire* (*albumen*), consists of two or three laminæ; it is composed, according to Gmelin, of *albumen* 12.0, *mucus* 2.7, *salts* 0.3, and *water* 85.0 per cent. The coagulability of albumen by heat, distinguishes it from casein. Albumen or glaire (or *ovalbumen*), is distinguished from albumen of the serum of the blood (*seralbumen*) by its being coagulated by ether.

Yelk (*vitellus ovi*) is a kind of yellow emulsion suspended in water by means of albumen, and inclosed in

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a sac called the *yelk-bag*. The yelk consists of *yellow oil, with crystallizable fat*, 28.75, *albumen* containing *phosphorus*, 17.47, *water* 53.8 per cent. (*Pereira, Op. cit.* p. 1389.)

The nutritive properties of both the white and the yelk of the egg are generally known. Popular opinion, which attributes more nutrition to the latter, is borne out by the preceding analysis; but the belief of the more ready digestibility of the yelk is at variance with our knowledge of its composition. It is the part most frequently employed in emulsion with sugar and water, or wine, to impart nutriment and some feeling of strength to those exhausted by excessive labour or by protracted disease. Both the white and the yelk are more readily digested when in the soft than when in the hard state. The difference indeed is often as great between a soft boild egg and one that is hard boiled, as between any easily digestible article we might select, and one that is avowedly indigestible.

The remarks which I made on the dietetic value of cheese will apply to eggs. Alone, soft-boiled, and eaten with bread or potatoes, or their equivalents, it is nutritive and digested with ease; but if hard boiled, or made a part of a meal in which animal flesh is freely used, then will eggs often be complained of, not because they are unwholesome, but because they needlessly augment the quantity of animal food at a meal. Mixed with flour and butter, or lard and sugar, they are largely used in the manufacture of cakes: in this state of combination they are, it seems to me, often oppressive to weak stomachs. The common addition of butter to an egg which has been overdone, is adverse to peptic precepts, since it is adding one kind of animal oil to another kind, that of the yelk, and which is of itself more than can always be well disposed of by a weak stomach.

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A stranger to the great and diversified alimentary wants of a great city will be surprised to hear of the immense number of eggs taken to and consumed in London. In addition to the vast quantities brought to that capital from the country, there have been no fewer than 62,591,817 eggs imported from the continent, chiefly from France, for the use of the people of the metropolis and Brighton, in one year, (1832.) Those imported from France amount to 55,000,000. "At this moment, indeed," writes Mr. M'Culloch, "the trade in eggs forms a considerable branch of our commerce with France, and affords constant employment to a number of small vessels."

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CHAPTER XII.

ANIMAL AND MIXED FOOD.

Division of animal substances of the higher order—The fibrinous—beef, mutton, pork, duck, fowls, and venison. The gelatinous—veal, lamb, young poultry, certain fish—Animal food of a middle nature—Albuminous aliment—Modes of preparing meat for the table—Preservation of meat—Salt, an aid to digestion—Its early and general use—Whence procured—Quantity consumed in some countries—Beef and pork, the chief meats salted—Dry salting and pickling—Quantity of salt meat consumed—Irish exports—Salting of fish—Herring and cod salted—large exportations of—Alimentary value of salt meats—Scurvy, how avoided—Variety with simplicity of food—Mixed food—Experiments in Scotland—Advantages of an abstinence from animal flesh—Mr. Stephens's experience—Large consumption of meat not a test of civilization—Proportionate use of meat in London, Paris, Brussels, Glasgow, and Geneva—Portable soup—different kinds and preparation of—Mode of preserving meat unchanged for a term of years.

My notice of the higher forms of organized animal substances used for food will be brief. They have been divided into the fibrinous, the gelatinous, and the albuminous. Under the first head, in which fibrin predominates, we have the flesh of those animals of adult age whose muscles are red and charged with osmazome. When dressed for the table, the flesh assumes a brownish or reddish-brown hue: it includes beef, mutton, venison, hare, geese, ducks, and pigeons. These are called the dark meats, and when the animal which furnished them was

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not too old, and the muscular fibre is not too firm or hard, they supply abundant and stimulating nutriment. The chief art, and that which in common cookery is seldom attained, for preparing them for the table, is to preserve sufficient softness of fibre and natural juices. Of the various fashions, stewing is perhaps the best for a weak stomach. These meats furnish the most stimulating and nutritive soups, and both in their solid state and in the last mentioned mode of preparation, they are best adapted to the phlegmatic, to those who encounter much labour and bodily fatigue in the open air, and in the case of convalescents where there is no fever, thirst, or hot skin, or suspicion of remaining inflammation of any organ.

There are differences in the nutritive power as well as digestibility of some of these meats. Beef is regarded as more nourishing, and as enabling a person accustomed to flesh meat, to bear more fatigue and display more strength than if he were to eat mutton. Humphries, an English pugilist, was for a while fed on beef, but as he got too much flesh in consequence, he was obliged to change to mutton. On the other hand, I am fully persuaded that beef is not nearly as digestible as mutton, by dyspeptics and other invalids; and hence, by these persons, whether they refer their sufferings directly to the organs of digestion or to oppression at the chest and palpitation of the heart, or to violent headache, or remoter pain of the limbs, mutton should have the preference over beef. They who are predisposed to convulsions, or to apoplectic seizure, will incur no little danger by careless and imperfect mastication of beef, and swallowing the pieces without adequate comminution. I have known fatal apoplexy to be brought on by a full meal of beef in an old person, who had scarcely

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masticated the meat; and on another a fatal return of the disease from a similar cause.

When animal broth is allowable, the lean of good beef is better than that of mutton, as less greasy, and with more osmazome in its composition.

Pork, classed with the fibrinous meats, has less tenacious fibre, and more fat both external to the muscles and interposed between their filaments. Except the Jews and Mohammedans, the people, in most parts of the world, are eaters of the flesh of swine. Pork was considered, by the ancients, as the most wholesome and nourishing of meats; and hence, as Galen has remarked, after Hippocrates, it is the food best adapted to the strong and robust, and to those habituated to violent exercises. It formed the chief animal aliment of the athletæ of Greece and Rome, who complained of a sensible diminution of their strength, when they abandoned its use for any length of time. To the labourer in the open air, pork, in moderate quantities, is a nourishing and wholesome aliment, on condition that a full proportion of esculent roots, or of boiled cabbage,* or spinach, be eaten with it. The addition of a little vinegar to the salt used will not be amiss. But the artisan, and the citizen generally, who takes little out-door exercise, and whose digestion may, from other causes, be enfeebled, had better avoid pork. It not unfrequently purges those who are unaccustomed to its use.

The gelatinous class of meats include those of the young of most animals, in which not only fibrin is in smaller proportion than in adults, but in which, also,

* If the water from the first or half boiling be thrown away, and the process completed in fresh water, much of the unpleasant flavour and effects of boiled cabbage will be prevented.

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osmazome is nearly wanting. Certain tendinous parts of animals, such as the feet and legs, furnish gelatine in large proportion, and hence they are used in the preparation of jelly. Broths made of gelatinous meat, such as veal, should be boiled sufficiently long for the extraction of the gelatine, and until they become so charged with it that they readily gelatinize on cooling. Common veal broth, wanting the stimulus of osmazome, and having acquired more fat than gelatine, is hard of digestion by dyspeptics. But if the boiling be continued in a moderate quantity of water until the gelatine is freely exhausted, the broth, with a suitable addition of salt, is both digestible and nourishing.

Lamb six months old, is, we are told, more tender than one two months old.

Meats of this class are better adapted than the fibrinous to the young, the sanguine and the plethoric, to those recovering from fever and inflammatory diseases, and, in general, to those who are restricted from a free use of animal food.

Of a middle nature between the fibrinous and gelatinous,—that is, participating in both,—is the flesh of poultry and of certain fish: the fibres, though of a less decided colour, and even in some cases white, are akin to those of the dark meat, while the intervening tissue furnishes gelatin largely. Poultry, again, such as capons, pullets and turkeys, varies in its dietetic effects, according as it is young and gelatinous, or old and more fibrinous and mixed with fat. Associated with the former, are sole, whiting, perch and carp, and with the latter, cod, mackerel, eel, shad and salmon.

Poultry of middle age furnishes the most esteemed food to the chronic invalid and the convalescent from acute disease. The fatter ones are not so well adapted

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to dietetic uses as the others; and it ought to be enjoined on the cook, if she be required to make chicken broth, for example, to remove the skin first, for there adheres to it a good deal of fat, which, if allowed to remain in the broth, would cause gastric uneasiness in the invalid. In eating either roast or boiled fowl, of either the white or dark meats, a dyspeptic ought always to abstain from the skin.

Albuminous aliment includes oysters, muscles, eggs, roe of fish, brain, liver and blood, and sweet bread.

There are various modes of preparing animal flesh for alimentary use,—as by boiling, baking, roasting and stewing. The external or hard coat, formed by baking and roasting, and into which much fat has infiltrated and been converted into empyreuma, should be avoided by the invalid. By the common fashion of boiling meat for the table in a large quantity of water, and in open vessels, much of its flavour and juices are lost. In a close vessel, and in a small quantity of water, over a slow fire, the result is different: the texture of the meat is soft, and its flavour well preserved.

Various plans have been adopted for preserving meat so as to render it fit for use at future periods and in distant places. Of these, salting is the most common, and that which has been practiced to the greatest extent. I ought to mention, in advance, that of all condimental additions to food, and particularly to animal food, salt is the most generally employed. Its use in this way is very instrumental to healthy digestion; indeed, according to some physiologists, it is by its decomposition that the gastric juice derives the supply of hydrochloric (muriatic) acid, which is one of the chief solvents of food in the stomach. By both civilized and savage people, salt is used with their food, and is in virtue of what might

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be called an instinctive appetite. The earliest notice of salt occurs in Genesis, xix. 26, Lev. xi. 13, and in the Iliad, lib. ix. 214. Its moderate and regular use, is a good preservative against intestinal worms. We are told of different instances of persons who, from aversion to the use of salt, have been dreadfully affected with worms. Its effects on animals, particularly the ruminants, are very salutary: it gives more consistence to the fat and more taste to the meat of animals, fed with a view to their being killed for market. It also prevents in them the effects of rainy seasons and wet pasturages. The sources of supply of this valuable article, are, first, from the water of the ocean, hence its common name of *sea* or *marine salt;* second, from mines; and third, from saline springs. It is found in certain plants, and in the blood and other fluids of man. The chemical names of salt are *muriate* or *hydrochlorate of soda*, and, more recently, *chloride of sodium.*

The salt consumed in Great Britain, is procured by the evaporation of the water of brine springs. The salt districts are in Cheshire, Staffordshire and Worcestershire. The principal salt mines on the continent of Europe, are at Wielitska in Poland, Catalonia in Spain, Loowur in Hungary; to these may be added many places in Asia and Africa. In the United States, a large quantity of salt is procured from the saline springs, in Salina, state of New York, near Pittsburg in Penn., on the Kenhawa in Virginia, and elswhere, making a total of 7,000,000 bushels. In addition to this home supply, a great deal is imported from Portugal and the Cape de Verds, where it is made from sea water. Upwards of 2,500,000 bushels were obtained from the Salina springs, in 1838, and about 2,000,000 from the Kenhawa springs.

The consumption of salt in some parts of Europe and

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in the United States, is immense. That in France is estimated at nineteen and a half pounds per individual annually, and in England as high as twenty-two pounds for each person. Taking the population of Great Britain at 16,500,000 persons, at the time when the calculation was made, and this would require the consumption of 363,000,000 pounds, or 161,000 tons. Exclusive of this immense home consumption, there is an annual export of 10,000,000 bushels, which, at 56 lbs. a bushel, is equal to 250,000 tons:—of this, in 1831, 2,130,000 bushels were sent to the United States. In 1840, our imports of this article were valued at rather more than a million of dollars.

All kinds of animal substances may be preserved by salt; though beef, pork and fish are the staples for this purpose. The pieces of the animal in general best suited for salting, are those which contain fewest of the large blood-vessels, and are most solid. Salting is performed in different ways, either by dry rubbing, or by immersing the meat in pickle previously prepared. Meat will keep longer by the first of these processes, or dry salting; but it is more altered in its desirable properties, than by the latter.

Beef, and pork in a less degree, properly salted with salt alone, acquire a green colour, but if an ounce of saltpetre be allowed to each five pounds of salt, the muscular fibre takes on a fine red colour: this apparent improvement, however, is more than compensated for by its becoming harder and harsher to the taste, to correct which a proportion of sugar or molasses is added; but the red colour, if desired, may be given without hardening the meat, by the addition of a little cochineal. Salted meat is either preserved immersed in pickle in close vessels, or dried, when it gets the name of bacon, ham, or hung beef. The drying of salt meat is effected either

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by hanging it in a dry and well warmed place, or by exposing it at the same time to wood smoke, which gives it a peculiar flavour, much admired, as in the Virginia and Westphalia hams and Hamburgh beef, and which also tends to preserve it by the antiseptic action of the pyroligneous acid.

The quantity of bacon and hams exported from Ireland and sent for the most part to England, is believed, by Mr. McCulloch, to amount to little less than 500,000 cwt. a year. That of pork, salted and packed, may be estimated at 150,000 cwt.

The consumption of salt beef is not nearly as great now, in England, as it was in former times, when it was usual for most families, at least in the country, to supply themselves with a stock of salt beef in October or November, which served for their consumption until the ensuing summer. The universal establishment of markets, where fresh beef may at all times be procured, renders the practice of salting beef no longer necessary. From considerations similar to those which existed in England, the agricultural part of the population in the United States, which includes, happily, by far the greater number of the whole, have recourse to the salting of pork, and, in the southern and western states, of subsequently smoking it. The consumption of this kind of meat must be immense in this country. There is hardly a household south of the Potomac, in which, as a matter of course, a quantity of pork is not *cured* by salting and smoking, every winter, adequate to the wants of the family, including often a large number of negro dependants, for the ensuing year. A similar provision of salted or pickled pork is made by the inhabitants of the northern section of the Union.

The exports of pickled pork, bacon, lard and live hogs,

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in 1840, from the United States, amounted to 1,894,894 dollars; and of beef, tallow, hides and horned cattle, to 623,373 dollars. The entire amount of animal provisions, including butter and cheese, was about 2,750,000 dollars.

The salting of fish constitutes a still more important and extensive branch of industry, and consequently contributes more to aliment, if we have reference to the number of countries concerned in the trade, than the salting of meat. The chief fish caught and preserved in this way are herring, mackerel, cod, salmon and pilchard.

To Beukels or Beukelson belongs the honour of the invention of pickling or salting herrings, in the latter part of the fourteenth century; and it was better timed gratitude than most sovereigns exhibit, when Charles V. visited his grave and ordered a magnificent tomb to be erected to his memory. Since this early period, the Dutch have uniformly maintained their ascendency in the herring fishery; but owing to the Reformation, and the relaxed observance of Lent, in Catholic countries, the demand for herrings upon the continent, is less than it was three or four centuries ago. The total quantity of herrings cured by those engaged in the English herring fishery, in 1831, was within a few hundreds of 440,000 barrels, of which 265,000 barrels were exported.

Cod is prepared in two different ways; that is, it is either gutted, salted, and then barrelled, in which state it is denominated green or pickled cod,—or it is dried and cured, and then it is called dried cod. About eight-tenths of the dried fish exported from Newfoundland by British subjects, are sent to Spain, Portugal, and other continental nations; the rest goes to the West Indies and to Great Britain. In 1831, the American exports, resulting from the Newfoundland fisheries, amounted to 250,514 quintals of dried, and 108,770 of pickled cod; their aggregate value being 1,050,000 dollars. In 1840, the amount was only equal to 541,000 dollars. The average annual produce of the French cod fishery, from 1826 to 1830, was 244,601 quintals. The quantity of codfish, particularly that which has been dried, exported from Norway, is great. The average annual amount of mackerel taken by United States citizens and vessels, from 1831 to 1835, was 274,000 barrels.

The alimentary effects of salt meat and fish will vary with the quantity of vegetable food taken at the same time, and the state of atmosphere in which the persons using it habitually live. The disease of scurvy, which was at one time attributed almost entirely to a diet of salted animal matters, is fully as much developed by a humid atmosphere and defective or faulty vegetable aliment, as by the cause popularly assigned. On board ship, if the crews have dry and well aired quarters, there is great probability of their being exempt from scurvy, even though their food should be, as far as relates to the animal portion of it, entirely of salt meat. My own observation induces me to believe, very firmly, that if the crews of vessels be supplied with fresh water in abundance, biscuit of good quality, and the customary allowance of beans or peas, with a modicum of molasses and vinegar, they may eat daily, for a twelvemonth, of salt beef or salt fish, without suffering from scurvy, provided all the condition before mentioned, of dry hammocks and dry clothing, when they turn in, be complied with. I have been on board a vessel which had a six months passage, all but seven days, from the Mediterranean to China, without my having had to treat a single case of scurvy, or even of disease complicated with scorbutic symptoms. The return passage in another vessel, with another crew, from Canton to Cowes, England, was five

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months and a half; but we were equally clear of scurvy as before. In both instances, the men were well fed and well treated—in the manner which I have just indicated.

Heartburn, waterbrash, and other dyspeptic symptoms, are represented to be very common among those who eat much salted and smoked meats. That the accusation is well founded, in many cases of persons of feeble powers of digestion, must be admitted; but in general, when not eaten in quantity, and if good bread and succulent vegetables be taken at the same time, this kind of aliment may be considered as well adapted, at any rate, to the active and laborious class of people, in both town and country,—by whom, in the United States, it is freely consumed. But although the quality be not objectionable, we must protest against the excessive quantity used by the American people, both of this and other kinds of meat—the salted and the fresh.

I have throughout this work advocated variety, and admit that a small portion of animal food is useful and proper to be added to the fuller supply of nutrimental vegetable substances at the same time. The classes of persons to whom this cautious limitation more emphatically applies, are children and females, whose health and constitution are so often broken down by excessive alimentation and deficient exercise.

In proof of the relatively small amount of food of any kind, and the fraction of reduced animal matter particularly, on which health can be well maintained, I shall introduce, in this place, the following particulars. They are derived from the "Fifth Report of the Inspectors of Prisons of Scotland," &c.: By Frederick Hill, 1840.*

* This Extract was sent to the author of this work by Mr.

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"During the present year, an experiment in diet has been made in the Glasgow Bridewell, which, although not carried on for a sufficient time, and under a sufficient variety of circumstances, to render it safe to adopt as a guide, appears to me to be of sufficient interest and importance to record, and to submit to your lordship's attention. Eight different forms of diet were prepared, and a class of prisoners was placed on each diet, and confined to it for one month. Before commencing, each prisoner was examined as to the state of his health, and weighed; and the same was done at the end of the experiment. The following were the different diets, and the results of the various trials of them:

First Diet.—Cost, including cooking,* 2¾*d.*

Breakfast.—Eight ounces of oatmeal, made into porridge,† with a pint of buttermilk.

Dinner.—Three pounds of boiled potatoes, with salt.

Supper.—Five ounces of oatmeal, made into porridge, with half a pint of buttermilk.

Ten prisoners were put on this diet (five men and five boys), all under sentence of confinement for two months, and all employed at light work (picking hair and cotton). At the beginning of the experiment, eight were in good health, and two in indifferent

Combe, with a view to its insertion in that gentleman's "Notes on the United States of America;" but it came too late. Mr. Combe will not, it is believed, be displeased at the use to which his document is now applied.

* The cost of the different diets was calculated according to the prices of food at the time the experiment was made (February, 1840); at the ordinary prices of food, the cost would be lower.

† Porridge is oatmeal boiled in water, with as much salt as is wanted.

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health; at the end, all were in good health, and they had, on an average, gained more than four pounds each in weight, only one prisoner (a man) having lost in weight. The greatest gain was nine pounds four ounces, and was made by one of the men; the prisoner who was reduced in weight had lost five pounds two ounces.

Second Diet.—Cost, including cooking, 2¾*d.* The only difference between this diet and the last, was the substitution of a third of a pint of skimmed milk at breakfast for a pint of buttermilk.

Five young men and five young women were put upon this diet, some of whom had been in prison for several months. The men were employed at net-making; two of the women at weaving, and three of the women at winding and twisting. The result of the experiment on this diet was similar to that on the last, and was so far confirmatory of it. All were in good health at the beginning of the experiment, and all were in good health at the end. On an average, each prisoner gained rather more than four pounds in weight, —the greatest gain being twelve and a half pounds (by a woman), and the only loss (also a woman) being one pound. All the prisoners liked this diet; but they said they should prefer having it twice a week only, to having it every day.

Third Diet.—Cost, including cooking, 2¾*d.* This diet was the same as the first, excepting that the potatoes were baked instead of boiled. Three young men, two boys, and five young women were put upon this diet. Most of them had been in confinement about five months. The men and boys, and two of the women, were employed in weaving, and the three other women in winding and twisting. All were in

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good health, both at the beginning and at the end of the experiment. There was, however, an average loss of one and a half pounds in weight,—the greatest loss being ten pounds, by a man, who had been in prison nearly five months; and the greatest gain, six and a half pounds, by a woman, who had been in prison about eight weeks. The prisoners all disliked the baked potatoes.

Fourth Diet.—Cost, including cooking, $3\frac{7}{8}$*d.* Breakfast and supper, the same as in the first diet. Dinner; potato-soup, containing two pounds of potatoes, and a quarter of a pound of meat. It should be remarked, that this is the first of the diets which contains any animal food except milk.

Twenty-one prisoners were put upon this diet, viz. sixteen males, varying in age from fifteen to twenty-three, and five females, whose ages varied from fourteen to twenty. The periods of previous confinements varied from one month to nearly ten months. Thirteen of the males and one of the females were employed in weaving, one male in warping, one male in shoemaking, and one male in netmaking; the other four (females) were employed in twisting. At the beginning of the experiment, twenty were in good health and one in indifferent health; at the end, these twenty continued in good health, and the remaining prisoner had improved in health. On the whole, however, the prisoners lost in weight, the average loss being about one and a quarter pounds. The greatest loss was nine pounds, (by a male weaver, who had been in confinement about five months;) and the greatest gain was also nine pounds, (by a female weaver, who had also been in prison about five months.) Notwithstanding the greater expense

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of this diet, all the prisoners, without exception, disliked it.

Fifth Diet.—Cost, including cooking, 4¾*d.* Breakfast and supper, the same as in the first diet. Dinner, half a pound of meat and a pound of potatoes.

Twenty prisoners (fifteen males and five females) were put upon this diet. With the exception of two men who were rather old, the ages of the male prisoners varied from twenty-four to forty-five; those of the females from twenty-two to thirty-eight. The periods of previous confinement varied from a fortnight to ten months. Nine of the male prisoners were employed in weaving, two in warping, one in shoemaking, and the others in sundry employments. One of the females was occupied in weaving, and the others in twisting. At the beginning of the experiment, fifteen of the prisoners were in good health and five in indifferent health; at the end, those who had been in good health continued to be so, and two who had been in indifferent health had improved; the health of the other three remained indifferent. The average weight of the prisoners was nearly the same at the end of the experiment as at the beginning; upon the whole, however, there was a slight loss. The greatest gain was seven pounds, (by a woman employed in twisting, who had been in prison nearly five months;) and the greatest loss was eleven and a half pounds, by a man employed in weaving, who had been in prison about one month.

This was the most expensive of all the diets; nevertheless, it will be seen that its effects on the health of the prisoners was not so satisfactory as that of some of the other diets; nor was this diet generally liked by the prisoners, all in the class, except five, (four of whom were females,) preferring the ordinary prison diet, which,

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with variations in quantity according to the different kinds of work, &c. is the same as the seventh diet.

Sixth Diet.—Cost, including cooking, 3*d.*

Breakfast.—The same as in the first diet.

Dinner.—One pound of bread.

Supper.—One pound of potatoes.

Ten prisoners, five males and five females, were put upon this diet. All were young, their ages varying from thirteen to twenty, and only one being more than seventeen. The periods of previous confinement varied from six weeks to seven months, the average being four months. Excepting one, who was a shoemaker, all were employed at light kinds of work. All were in good health, both at the beginning and at the end of the experiments. On an average there was a gain in weight of two and three-quarter pounds per prisoner; the greatest gain being nine pounds, (by a female,) and the greatest loss six pounds, (by a shoemaker.) All the prisoners, except two girls, preferred the ordinary prison diet to this diet.

Seventh Diet.—Cost, including cooking, 3½*d.*

Breakfast and supper.—The same as in the first diet.

Dinner.—Two pints of broth,* containing four ounces of barley and one ounce of bone, with vegetables; also eight ounces of bread.

This, as already observed, is very much like the ordinary prison diet.

Ten prisoners were put upon this diet, (five young men and five young women.) The periods of previous confinement varied from three weeks to nine months. One of the men was employed in shoemaking, two in cabinet-making, and two in winding. Four of the wo-

* Anglice "Soup."

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men were occupied in winding and one in sewing. All were in good health, both at the beginning and at the end of the experiment. Upon the whole, there was a decrease in the average weight of the prisoners, but the decrease was not quite half a pound each. The greatest loss was five and a half pounds, by a man who had been in prison five months, and who had been employed in winding; and the greatest gain was seven pounds, by a woman, who had also been in prison about five months, and who was also employed in winding.

Eighth Diet.—Cost, including cooking, 1⅜*d.*

Breakfast.—Two pounds of potatoes, boiled.

Dinner.—Three pounds of potatoes, boiled.

Supper.—One pound of potatoes, boiled.

A class of ten young men and boys was put on this diet. All had been in confinement for short periods only, and all were employed at light work, teasing hair. At the beginning of the experiment eight were in good health and two in indifferent health; at the end, the eight continued in good health, and the two who had been in indifferent health had improved. There was, on an average, a gain in weight of nearly three and a half pounds per prisoner, the greatest gain being eight and a quarter pounds, by a young man, whose health had been indifferent at the beginning of the experiment. Only two prisoners lost at all in weight, and the quantity in each case was trifling. The prisoners all expressed themselves quite satisfied with this diet, and regretted the change back again to the ordinary diet.

Upon the whole, the prisoners who were put upon these different diets increased in weight and improved in health, the females improving most in health, and gaining most in weight. How far any one of these diets would prove to be superior to the others in a long

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experiment, and with prisoners of different ages, employed at different kinds of work, and confined for different periods, I cannot say; but so far as a trial of one month can be depended upon, it would appear that the cheaper diets, and those containing no other animal food than milk, are the best. There can, however, be no doubt that, whatever diet be chosen, whether one without meat or not, it should allow of frequent changes, giving a preference to each article of food in its season."

To the same purport, the advantages of a limited quantity of reduced food, that is, of vegetable, with a very small proportion of animal substances, and under different circumstances, is the testimony of Mr. Stephens, who is certainly no ascetic. The passage to which I refer is in Chapter XVI. of his entertaining work, entitled,—*Incidents of Travel in Egypt, Arabia Petræa, and the Holy Land;* and occurs in his remarks on the monks at the convent of Mount Sinai.

"Their discipline," says Mr. S., "was not rigid, save in one particular, and that a matter in regard to which there has been much discussion with us; they never ate meat; no animal food of any kind is permitted to enter the walls of the convent. During all the various periods of their abode in the convent, some thirty, some forty, and one more than seventy-five years, not one of them had eaten a particle of animal food; and yet I never saw more healthy-looking men. Hardier men I have seen, for they are indolent in their habits, take but little exercise, and in most cases show a strong disposition to corpulency; but I had some little opportunity of testing their ability to endure fatigue; and, though the superior soon walked himself out of breath, the monk who guided us up the mountain, and who was more than sixty years old, when he descended, after a hard day's labour,

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seemed less tired than either Paul or myself. I am aware that climate may make a difference; but, from my own observation and experience, I am perfectly satisfied that, even in our climate, invalids and persons of sedentary habits, and, indeed, all except labouring men, would be much benefited by a total abstinence from animal food. I have travelled for a week at a time, night and day, not under the mild sky of the East, but in the rough climate of Russia, and found myself perfectly able to endure the fatigue upon bread and milk diet; and I have been told that the Tartars, who ride post from Constantinople to Bagdad in an incredibly short time, never sleeping, except on horseback, during the whole of their immense journey, rigidly abstain from anything more solid and nutritious than eggs."

It so happens that the greatest consumers of meat in civilized countries are inhabitants of the cities,—the very class of persons, who are prevented, in general, from taking that exercise in the open air, or working under a similar exposure, by which alone the bad effects of this kind of gross alimentation can be obviated. Mr. McCulloch seems inclined to make the increased consumption of animal food a kind of evidence if not test of progressive civilization; but the English, from the time of Julius Cæsar, always indicated a marked preference for beef and other meat, and their fondness for, and consumption of such aliment at this time may be regarded as an original penchant of the same nature as some other longings of their Anglo-Saxon descendants in both hemispheres; such, for instance, as that of appropriating to themselves the lands of other people, whether they are on the Ind or beyond the Ganges, in New Holland or in Texas and Mexico. The inhabitants of the Llanos in Caraccas, and of the Pam-

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pas of La Plata are greater beef-eaters than the represented wisdom of the Londoners, in Common Council; but yet we cannot say much of either the actual or progressive civilization of these people.

Some idea may be formed of the great attention given by the English to the raising of cattle, for the dairy and the supply of animal flesh, as well as of horses, &c. for draught and locomotion, from the proportion of land in pasturage. Mr. Marshall* shows, after a tabular statement of the superficies of each county in England and Wales, and the quantity of land for pasturage and tillage in each, that the entire amount in both these last mentioned countries is, *in tillage,* 10,661,000 statute acres,—*in pasture,* 15,869,120; and in *woods and unproductive,* &c. 10,125,080.

The amount of cattle annually slaughtered in Great Britain (England, Wales, and Scotland,) for the use of the inhabitants, is estimated by Mr. McCulloch at 1,275,000. Assuming the population of London to be 1,450,000, and the entire amount of meat consumed in this capital being 154,434,850 lbs., the annual consumption of butcher's meat is, this gentleman thinks, very near 107 pounds for each individual, young and old. The estimate of Mr. Middleton goes far beyond this: he supposes it to be, exclusive of fish and poultry, 234 lbs. for every individual. According to Mr. Chabral, the consumption of butcher's meat in Paris amounts to between 85 and 86 lbs. for each individual. Another estimate (see Bowring, Com. Report on Switzerland) makes it 93 lbs. At Brussels, the consumption is supposed to average 89 lbs. for each person. In Glasgow,

* Digest of all the accounts relating to the population, productions, revenue, &c. of Great Britain and Ireland.

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the use of butcher's meat is in nearly the same proportion as it is in London. In Geneva (city), it is the highest, being 118 lbs. for each individual,—or for the entire population of 24,000 inhabitants, 3,068,170 lbs. of beef, veal, mutton and pork.

Allusion has been already made to the preparation of gelatin, called *portable soup*. This is more readily procured, by digesting the bones in hydrochloric acid, so as to extract the earthy matter (phosphate of lime), and then by boiling the residue in water under pressure. This process, by the benevolent exertions of M. D'Arcet, in Paris, has been carried on to a great extent, with a view of furnishing the poor with animal nutriment at a small cost. But without the addition of some fatty matter, such as lard, and also osmazome, this much-lauded gelatin is a very indifferent food. The introduction of some leguminous seeds, and a little onion into the gelatin soup, gives it a higher flavour, and the beans or peas increase its nutrimental properties.

The following is a better, and more generally used, kind of portable soup for long voyages: Beef and gelatinous parts, in the proportion of twelve pounds of beef, ten pounds of mutton, four calves-feet, three fillets of veal, are to be boiled in water, as in the common way of preparing meat-soup for the table, every now and then skimming off the fat until the soup possesses the requisite flavour. It is then to be allowed to cool, and is better skimmed at this time than before: whites of egg are to be added to clarify it, and afterwards it is to be slightly boiled. The liquor is then to be strained through flannel, and gradually evaporated, in the water bath, to the consistence of a very thick paste, which is to be spread rather thin upon a smooth stone, then cut into cakes, and, lastly, dried in a stove until it becomes brittle.

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These cakes consist of gelatin and osmazome, and are of course quite nutritive: they will keep for years, if carefully put away in boxes and protected from the air. When intended to be used, nothing more is required than to dissolve a sufficient quantity in boiling water, which, with the addition of salt, makes at once a palatable soup. Fowls, as hens and turkeys, may enter into the composition of these cakes; or, if a cheaper compound be required, the gelatinous portion may be increased by the addition of bones, prepared in the manner already specified.

Animal food of every kind, and even the most delicate vegetables, may be preserved unchanged, if heated to the temperature of boiling water, in vessels from which the air is completely excluded. Food, thus prepared, has been kept for fifteen years; and upon opening the vessels, after this long time, it has been found as fresh and well-flavoured as when originally put in them. The process is as follows:—

Let the substance to be preserved be first parboiled, or rather somewhat more, the bones of the meat being previously removed. Put the meat into a tin cylinder, fill up the vessel with seasoned rich soup, and then solder on the lid, pierced with a small hole. When this has been done, let the tin vessel thus prepared be placed in brine and heated to the boiling point, to complete the cooking of the meat. The hole of the lid is now to be closed by soldering, whilst the air is rarefied. The vessel is then allowed to cool, and from the diminution of volume, in consequence of the reduction of temperature, both ends of the cylinder are pressed inwards and become concave. The tin cases, thus hermetically sealed, are exposed in a test-chamber, for at least a month, to a temperature above what they are ever

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likely to encounter; from 90° to 110° F. If the process has failed, putrefaction takes place, and gas is evolved, which will cause the ends of the case to bulge, so as to render them convex, instead of concave. But the contents of those cases which stand the test will infallibly keep perfectly sweet and good in any climate, and for any number of years. If there be any taint about the meat when put up, it inevitably ferments, and is detected in the proving process.—*Ure's Dict. of Arts and Manufactures.*

There is yet one other means of preserving parts of animal flesh, which is quite general in some countries, as Germany, and, to a certain extent, common in a great many. It is by cutting up or mincing different parts of the animal, adding savoury herbs and spices, and pressing the whole into masses of various sizes, often into the clean intestines of animals, and then smoked. To this compound the term sausage is applied. Blood-sausages, usually called black-puddings, made of bacon and coagulated blood, are among the coarsest and least digestible variety. Sausages sometimes undergo a modified putrefaction, and become an irritant poison. Various accounts have been given of the sausage poison by Drs. Kerner, Daun, and Horn. It has, at various times, committed great ravages in Germany, especially in the Wirtemberg territories, where 234 cases of poisoning with it occurred between the years 1793 and 1827; and of that number, no less than 110 proved fatal. Those sausages only become poisonous, which have been boiled before being salted and hung up, or when the spices and salt are deficient, and particularly when they are smoked too late or not sufficiently. They are poisonous only at a particular stage of decay, and cease to be so when putrefaction

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has advanced so far that sulphuretted hydrogen is evolved. The central part is often poisonous when the surface is wholesome.* (See *Christison on Poisons*, p. 585–8: 3d edit.; and Liebig, *Organ. Chem.* p. 307–8.)

Cheese, also, on occasions, becomes poisonous, without any peculiarity in its appearance, taste or smell to indicate such a property. The symptoms produced by it are nearly the same with those caused by the poisonous sausage. They constitute various degrees and combinations of gastro-enteric inflammation. In the most severe cases, the quantity taken did not exceed four ounces, and was sometimes only an ounce. In some of the poisonous cheeses noticed, "the curd, before being salted, is left for some time in a heap to ferment, in consequence of which it becomes sour, and afterwards ripens faster. But if the milk has been curdled with vinegar,—if the acid liquor, formed while it ferments, is not carefully drained off,—if the fermentation is allowed to go too far,—if too little salt was used to preserve the curd, or if flour has been mixed with the curd, the subsequent ripening or decaying of the cheese follows a peculiar course, and a considerable excess of caseic acid is formed, as well as some sebacic acid." (*Christison, Op. cit.*)

* The person poisoned by putrefied sausages suffers from a gradual wasting of muscular fibre, and of all the constituents of the body similarly composed: he becomes much emaciated, dries to a complete mummy and finally dies. The body is stiff, as if frozen, and is not subject to putrefaction. During the progress of the disease, the saliva becomes viscous and acquires an offensive smell.

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CHAPTER XIII.

DRINKS.

Water the basis of all drinks—Its importance in organized life—Thirst only to be allayed by water, or drinks chiefly watery—Instinct always craves water—Is the only fitting drink—Its restorative powers,—contrasted with alcohol—Water of various degrees of purity—Means of clarifying water—Zinc roofs deteriorate water flowing from them—Hippocrates and Dr. Gregory's opinion respecting water—conditions adapting it to all persons, at all times—Temperature,—cold often beneficial—Water is nutrimental—Drinks, made of various acids, fruits, &c. added to water—Simple, saccharine, gummy, and bitter drinks—Conditions for a drink being salutary—Tea, its varieties,—first use in England;—consumption of, at this time, in England and United States—Composition and properties of tea;—when it is detrimental.—Coffee,—its native country,—different varieties of,—amount of its production and consumption,—its first use in France and England—Is affected by other substances near it—Composition and properties of raw and of roasted coffee—Cases in which coffee is beneficial, and in which injurious.

Drinks, on which I shall now make some observations, are either of pure water or have water enter into their composition. Even those most inimical to health and the discharge of the functions of the living frame, or the alcoholic, consist, in good part, of water. But for this salutary dilution of their strength, alcoholic liquors, when drunk, would prove almost instantaneously poisonous. Of the continual necessity of the

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human, as indeed of every organized living body, for a supply of water, the reader has been able already to form an idea, from remarks in a preceding chapter, on the aqueous principle of food. Vitality cannot be evinced, by a manifestation of any of its properties, in vegetable or animal structure, without the presence of water, which forms so large a proportion of the sap of plants and the blood of animals, and enters into the composition of all the vegetable and animal substances used for food. Digestion cannot be carried on in any of its stages without a due, and that is a large, proportion of water. Without this liquid, the alimentary matter could not be reduced to chyme, nor the chyme furnish chyle, nor the chyle become blood. By it is this vitalizing fluid fitted to flow in its vessels, and be conveyed to all the organs and tissues, in order to deposit in them their appropriate materials for growth and renovation. Largely introduced into the body for its support and vitality, water is also largely given out in the various secretions. It is indispensably necessary for a balance of the functions to be preserved.

Thirst can only be allayed by water, or drinks mainly composed of water, with the addition to it, in a small degree, of some other principle, acid, saccharine, mucilaginous, or sometimes bitter. Whenever man is left to the cravings of the instinct of preservation of his frame, as when wandering in the desert, or on a wrecked vessel, or tossing about with fever, he snatches at water as the only beverage to quench his thirst, cool his system, and renovate his decaying strength. Next to the nutritive fluid furnished by the maternal bosom, water is the one taken with avidity by the infant, as, if left to his primitive taste, it ever would be

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by adult man; and even he, who in the madness of his evening revel drinks deep of the intoxicating bowl, and stoutly denies the fitness of water as a beverage, will, on the following morning, entreat for and clasp with eagerness the full pitcher of this liquid, which a few hours before he had so insolently derided. Both instinct and recovered reason now suggest the choice of the proper beverage; and, but for the curse of imitation and evil example, their joint influence could never be mistaken.

When we say that water is the only fitting drink for man's daily and habitual use, we are sustained by the facts of the case. Water is the only liquid which is essential to the formation, development, and support of his frame: it is equal to all the exigencies of thirst, for the relief of present inconvenience, and of dilution, by mixing with his blood and other fluids, to prevent farther suffering and disease. Water is found in all climates and habitable regions of the earth; and Providence has nowhere offered in fountain, stream or well, in river or in lake, any liquid as a substitute for water. To be the universal beverage, it ought to be, as it is, everywhere attainable, and adequate to all our natural wants,—of appetite, growth, bodily and mental exercise, and activity. Even when the health suffers, and the body and mind are ill at ease, where is the restorative liquid or agent of any kind which can revive and renovate like water,—whether taken alone, in its purity, or with some slight saline and mineral impregnation. It is the beneficent menstruum and conductor of medicinal matter into the blood; and even when they are refused entrance, it readily finds its way, and not seldom accomplishes the cure for which they are lauded. How different the case with alcohol. If it is the men-

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struum of medicinal substances,—it soon abandons them, and can neither obtain for them entrance, nor find its own way into the blood; and if in strange and anomalous cases it even is introduced, its action is deleterious, and, if in quantity, is soon deadly. It does not form a constituent part of any tissue or of any fluid in the healthy body; it retards, in place of aiding, those series of changes which the aliment undergoes before it is converted into blood: it is perturbating always, and deleterious generally to the functions, whether they be merely of nutrition, or those by which man is enabled to speculate on his own situation, and to fulfil his higher destiny.

Water, although it is found in all regions of the earth, is far from being equally good in all,—as when it bubbles up from the mountain spring, or is distilled from the clouds in the shape of rain. The two most common changes which it undergoes adverse to its culinary uses are, 1, owing to the large addition and mixture of earthy matters, by which it becomes turbid or muddy; 2, owing to its impregnation, and consequently unpleasant taste, by the solution in it of saline matters, and sometimes of gases. By rest, the earthy matters, which were merely suspended in the water, will mostly subside, and leave it comparatively clear; but a still more efficient means of clarifying it, is by filtering. There is a great variety of processes for attaining this object; but all are founded on the same principle, viz. the interposition of bodies, in the passage of the water, through which it parts with the foreign matters that are merely suspended or imperfectly mixed with it. The separation, therefore, is mechanical. A common instrument for the purpose is a filtering stone, sufficiently porous to allow of the percolation of water

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through it, but retentive of the grosser particles and impurities. Of the like nature, but, in some respects, better, because allowing of a complete removal of the impurities which obstruct the passage of water through the filter, when it has been some time in use, is the following simple contrivance: A large earthen funnel, or stone bottle with the bottom beaten out, may have its neck loosely stopped with small stones, over which smaller may be placed, supporting layers of gravel increasing in fineness, and, lastly, covered to the depth of a few inches with fine sand, all thoroughly cleaned by washing. This apparatus may always be renewed, by taking out and washing the upper stratum of sand. A better method, again, is to filtrate by ascension:—this is done by having two jars, communicating together at the bottom; one contains the gravel, sand, &c.; in the other, the turbid water is poured, which finds its way into the second, and, rising through the filtering matters, comes up quite clear. By means analogous to these, but on a large scale, river water is purified for the use of the inhabitants at Paris, Glasgow, Paisley, Chelsea, and other places. An improved apparatus consists of a small box, lined with lead, and having at its lower part charcoal between two layers of sand. The passage of the water through this filter, is accelerated by artificial pressure, by which, from an equal body and surface of water, seventeen times the quantity can be passed as through a common filter in the same time. (*Ann. d'Hyg*. &c. t. XXI, p. 230-1.) The nauseous odour and disagreeable taste imparted to water by vegetable or decayed substances, or animalculæ, are removed by filtration,—through animal charcoal, or by common filtration and subsequent boiling.

In many places where both spring and river water are deficient, rain water is saved by the inhabitants in

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large cisterns for the purpose. At sea, when the regular supply of water runs out, recourse may be had, if favouring showers fall, to catch the rain, as it descends, on a sail spread horizontally midship; the centre of the sail being pressed downwards by a weight of any kind, so as to give it a conical shape. From this dependent and projecting part, the water drops through the canvass, and is received in a proper vessel beneath. Recourse has been had also to distillation of sea-water, with more or less success, and by apparatus of more or less simplicity. Its empyreumatic taste is prevented by the passage of the vapour from the still through animal charcoal.

The Egyptians clarify the water of the Nile, by putting almonds into it. Into an earthen jar filled with river water, a person introduces his arm and rubs the inside of the vessel with an almond paste in all directions, until a prescribed portion has been rubbed away: the inside of the jar being rough facilitates this operation. In this process the almond forms a kind of emulsion by its oil uniting with the earth of the water, and thus causes an imperfect precipitate. In Sennaar, Dongola, and in Nubia, beans and even castor oil seeds are used instead of the almond. M. D'Arcet, after describing the above, and the common method of filtration by filtering stones, next details a plan which he found more successful in clarifying Nile water. It consists in the introduction of a solution of alum or of the powder itself, in the proportion of a quarter or even half a grain to a quart of water. (*Ann. d'Hygiene*, &c. t. IV, p. 377–81.) This means had already been used with success by the father of M. D'Arcet, in purifying the water of the Seine, at Paris. The Chinese had long been in the practice of clarifying the turbid water of their rivers, by stirring the fluid which has been drawn,

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with a bamboo cane, into the hollow joint at the end of which a piece of alum had been introduced.

It is less easy to correct the taste of water which is impregnated with saline and mineral substances, such as common salt, and salts of lime, sulphur and iron. Fortunately, however, these waters are not found to be detrimental to health, and the people using them soon become accustomed to their peculiar taste. Where the water is impregnated with earthy or mineral carbonates, boiling will, to a certain extent, decompose these, and cause a precipitate to the bottom of the vessel; and in this way correct the unpleasant taste, and prevent in a measure the inconveniences to which those unaccustomed to them would otherwise be subjected.

Various methods were recommended and practised for purifying the water on board ship, which, after a time, becomes offensive to both smell and taste. One of the simplest and easiest is to expose the water to the air, by increasing its surface or by agitating and dividing it in the air by the aid of machinery. Charring the inside of the water casks was another approved method. But that which is now general in vessels of war, and in many merchantmen, is to put the water for the voyage in large iron tanks. The only recognisable change is an oxidation of the inside of the tank, and sometimes a slight ferruginous taste imparted to the water. The presence of iron seems to be necessary to the preservation of the purity of the water. When a water cask was coated with matter impermeable to moisture, the contained fluid still underwent the changes of decomposition, and became offensive, but when in a vessel similarly coated, some pieces of iron were put, the water remained as pure as if it was in iron vessels. (*Keraudren, Ann. d'Hygiene*, &c. t. IV.)

It has been ascertained by M. Boutigny, who insti-

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tuted a number of experimental observations on the subject, that the rain water flowing from zinc roofs is sufficiently impregnated with the oxide of this metal to be unfitted for a drink or being used in cookery. (*Ann. d'Hygiene*, &c. t. XVII.)

Of the superior fitness of water over every other liquid, as a drink, we have the testimony of nearly every physician of eminence, from Hippocrates down to the present time. After speaking of different kinds of water, —hard, soft, saline and chalybeate,—Hippocrates, with his accustomed practical spirit, says: "A vigorous man, who enjoys good health, need not care about a choice of water: he may drink that which is near him with convenience. But when he desires, on account of disease, to select the most fitting drinks, he will be guided by the following rules." I need not repeat them in this place, but proceed to observe, that with the invalid, the true question is, not what he shall add to water for his drink, either to make it palatable or to prevent its sitting heavy on his stomach or disordering his bowels: it is, the purity of the water and its temperature, as also the quantity to be drunk, and the time for drinking it. Dr. Gregory, after praising pure spring water,—and river water is still better,—as the best and most wholesome drink, and the most grateful to those who are thirsty, whether they be sick or well,—aiding, also, digestion, and strengthening the stomach, continues as follows:— Sect. MXXVII. "There are, indeed, some, though very few in number, to whom cold water, on account of a notable weakness, either of the body generally, or of the stomach, seems, on account of its coldness, to be prejudicial. Water, however, either made tepid or boiled, and allowed to cool, and thus made soft, as it were, is still suitable to these persons." (*Compestus Med. Ther.*)

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There is, in fact, no excuse for recourse to any cordial, especially to any alcoholic liquor, for drink, under the plea of either original or acquired weakness of stomach. On the contrary, almost the sole means, as far as drink is concerned, for recovery from and future avoidance of this infirmity, is to give a decided preference to a watery regimen. Even for the alleviation of present pain and spasm of the stomach, a tumbler full or two of *hot* water will, I know, prove prompt and efficient. I have again and again prescribed it in such cases, with the very best effects.

The *temperature* at which water should be drunk, at or between meals, is partly a matter of habit, and partly of temperament and original constitution. In general, that is best which represents the mean temperature of the place, in temperate latitudes, at least, in which one lives. Cold water may be more safely indulged in during the earlier part of the day, when the body is in its greatest diurnal vigour, than towards evening, when it is less able to resist strong impressions of any kind. In summer, when the skin is hot and dry, and the mouth and throat also dry, cold and even iced water, in moderate quantity, will be an agreeable and, at the same time, a salutary drink, by abating the excessive and almost morbid heat, which is apt to become, by the excitement it produces, a cause of indirect debility. Water of this coldness is better just before than during and after a meal, and if taken in the latter periods, it ought to be in smaller quantities.

Water, besides serving the purpose of dilution, and being the indispensable menstruum and medium by which other substances are kept in solution and conveyed from one part of the body to another, has also nutrimental properties of its own. A large proportion of that which

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is drunk, is speedily absorbed by the veins, and finds entrance at once into the circulation, some time before the product of the digested food is introduced by the way of the lacteals. We have well authenticated cases of persons who have lived for a length of time entirely abstinent from all customary aliment, and whose only drink was water. In the "Transactions of the Albany Institute," for 1830, Dr. McNaughton relates the case of a man of the name of Reuben Kelsey, who lived on water alone for fifty-three days. "For the first six weeks, he walked out every day, and sometimes spent a great part of the day in the woods. His walk was steady and firm, and his friends even remarked that his step had an unusual elasticity. He shaved himself until about a week before his death, and was able to sit up in bed to the last day." At the time of his death, Kelsey was twenty-seven years of age. His fasting from food was entirely voluntary, and under the influence of a delusion, manifested in his assigning as a reason, at the beginning of this course, that when it was the will of the Almighty that he should eat, he would be furnished with an appetite.

For all the proper wants of the animal economy, simple water, of the desired temperature, is generally, sufficient. It often happens, however, that there is thirst dependent on the state of the mouth and fauces, without any proportionate excitement or craving of the stomach and internal organs: this is most liable to occur in fevers, and after great labour and exercise in a hot sun, or being in a hot air: sometimes it depends upon a morbid state of the stomach, and hence almost constant thirst is an accompaniment of some of the varieties of dyspepsia. Whether we admit this distinction or not, it is still certain, that even after the stomach has received copious potations of water, in amount

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necessary to allay its heat and excitement, that in a very short time afterwards, thirst is complained of.—On such an occasion, the addition of some sápid substance to the water, produces a change in the organ of taste, and the entire mucous membrane of the palate and fauces, and the thirst is either greatly abated or removed.

An interminable list of articles has been employed with the view of adding them to water, and of agreeably affecting the palate, whilst they remove thirst. I shall only mention the chief of these; and first in importance, the acids, which, as abundant in the fruits of hot climates, and as readily developed by their fermentation, would seem to be destined by Providence to serve as quenchers of thirst and as refrigerents to the overheated frame. The chief ones are the citric, the acetic, and the tartaric; but as I have already spoken of their use in this way in a former chapter, I shall not return to the subject here. Lemonade ranks foremost of all the acid drinks; infusion of apples (apple water) is also a pleasant beverage; the same may be said of the infusion of tamarinds. Acetic acid, with water and sugar or molasses, make a drink much used, and the quantity and time of taking which are soon safely ascertained after a few trials. Mineral acids, such as the hydrochloric or muriatic, the sulphuric and the nitric, in a state of extreme dilution with water, impart to it a refreshing acidity; and in the absence of the vegetable acids, may, in cases of feverish thirst, and in serious disease, be had recourse to with advantage.

The juices of most of the mature fruits of our climate, containing as they do saccharo-acid matters, make, when mixed with water, a pleasant beverage. The jellies of some of them, as of currants and cranberries, are much and deservedly used in this way. I may mention, however, in this place, that a rising in the stomach, or feel-

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ings analogous to those of heartburn, acidity of stomach, as the disease is called, is more apt to follow the use of the compound juices of many fruits, in which the acid is in small proportion, than where it abounds or exists alone. Hence, the juice of the orange will often disagree with a dyspeptic or febrile patient, when lemon juice, or even lemonade, with a small quantity of sugar, would be attended with no inconvenience. Cider or wine will cause heartburn and acid eructations,—whereas vinegar and water, so far from giving rise to such disorders, will sometimes alleviate them.

Simple saccharine drinks, such as sugar and water and molasses and water, will often assuage thirst, and be relished by the persons using them. The *eau sucrée* is a common drink among the French, as molasses and water is among many of our own people. Sugar candy has, on occasions, served both for nourishment and to allay thirst, where neither common aliment nor water was procurable.

Infusions of different herbs which have a slight aromatic and bitter taste conjoined, are often used as beverages,—such are, among others, balm and sage teas. Even a decidedly bitter flavour, imparted by different vegetable substances to water, sometimes affects both the sense of taste and the stomach in such a manner as greatly to abate tormenting thirst in fever. Substances again, of quite a different nature, as the pure gums, destitute almost of taste and of any stimulating property whatever, will soothe the irritation which causes violent thirst, and prevent its return for a longer time than simple water or even water mixed with the vegetable acids. Gummy or mucilaginous drinks, and the best is that prepared with gum arabic, seem to act in two

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ways,—first, by soothing the nervous and capillary excitement of the mucous surfaces which gives rise to thirst; and secondly, by a portion remaining adherent to these surfaces; evaporation and consequent dryness of the tongue and mouth are prevented,—and consequently the call for fluid to moisten the mouth and throat is less urgent.

One remark is applicable to all the drinks hitherto enumerated; the craving for them ceases with the removal of the thirst for which they were first taken, and they are never continued on account of any pleasurable effects on the nervous system, whether of a stimulating or narcotic nature. Their occasional seldom becomes a continual use and habit, unless they are found, as in the case of saccharine or gummy drinks, to be in harmonious relation with the nutritive wants of the system; that is to say, of being beneficial to digestion, while they at the same time contribute somewhat to the nourishment of the frame. These are the only safe conditions on which any drink can be continued; they are complied with in the case of water and to infusions or mixtures of sugar, of saccharo-acids, of gum, of farinaceous matters,—such as toast and water, rice-water, and barley-water, &c., of which I have already treated. But these conditions are not complied with in the case of the infusion of any vegetable bitter, and still less of any alcoholic drink.

There are two beverages which, in modern times, and, still more, at the present age, have acquired a dietetic importance which entitles them to a fuller notice than their nutritive properties alone would require—I refer now to tea and coffee. Of the detailed histories of their introduction into general use in Europe I am unable to treat in this place, nor to repeat the many anecdotes connected with their first use. The leading traits

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of each, in their dietetic and medicinal character, must suffice for my present purpose.

TEA (*Thea Viridis* et *Thea Bohea*).—One of the earliest notices of tea-drinking in England is also characteristic of the unceasing vigilance of the rulers of that country to tax everything which is eaten or drank, or is used either as a necessary or a luxury. By an act of Parliament, passed 1660, in the reign of Charles II., a duty of eight pence per gallon was laid on all tea made and sold in coffee-houses, which were visited twice daily by officers, whose duty it was to ascertain what quantity had been made. The tea at this time was probably brought from Holland, for it was not until 1669 that the first invoice of tea was received by the East India Company, amounting to 143½ lbs. In a little more than a century from this time, or in 1771, and for nine years succeeding, there were no less than fifty millions of pounds of tea brought from China in English ships, of which thirteen millions were consumed in the British dominions. It appears, says Mr. McCulloch, that the consumption of tea in Great Britain has been about stationary, or has rather diminished from 1800 to the present period. This has been occasioned, he thinks, partly perhaps by the increased use of coffee, but more, he adds, by the enhanced price arising out of the increase of the duty, and the operation of the monopoly. In Ireland, the consumption has been about stationary since 1801, notwithstanding the population has more than doubled in the interval. The quantity of tea retained for home consumption in Great Britain in 1833, was 31,829,620 lbs., and for Ireland in 1827, the last year of record, 3,887,955. In 1800, the consumption in Great Britain was 20,358,702 lbs. Now as the population at this last date was a little under eleven millions, or

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10,941,778, and in 1830 was 16,575,605, including in both instances the army and navy, the consumption of tea ought to have increased in this latter time to nearly 32 millions, even supposing no increased taste for or consumption per individual. The actual consumption in 1830 was a little over 30 millions,—justifying Mr. McCulloch's observation that the consumption had been about stationary, or has rather diminished since 1800, to the period when he wrote. The rate of consumption would from this estimate be less than 2 lbs. annually for every individual in Great Britain. In 1838, there was an increase in the entire amount, which was 32,366,412. That for Ireland, supposing the entire quantity consumed in 1830 about the same as that in 1827, the average for each person would be not quite half a pound. The population of this country in 1830, was 7,734,365.

The average annual imports of tea in the United States, for the six years, ending with 1840, were about 14,500,000 lbs.

In commerce, two principal kinds of tea are distinguished,—the *Black* and the *Green*,—to the first belong *Bohea*, *Congou*, *Campoi*, *Souchong*, *Caper* and *Pekoe* or *Paho;* to the latter, *Twankey*, *Hyson-skin*, *Hyson*, *Imperial* and *Gunpowder*. Frank (*Gmelin*, *Handb.* d. *Chem.* II, 1252) analyzed both black and green teas, and obtained the following results:—

	Black.	Green.
Tannin,	40.6	34.6
Gum,	6.3	5.9
Woody fibre,	44.8	50.3
Glutinous matter,	6.3	5.7
Volatile matter, and loss,	2.0	2.5
	100.0	100.0

Sir H. Davy, (Phil. Trans. 1803, p. 268,) also found more tannin in black than in green tea, in the proportion of 48 to 41. But these results are opposed to our daily experience, as derived from flavour, which indicates the greater astringency in the green tea, and to the experiments of Mr. Brande, (*Quart. Journ.* XII, 201.) The difference in the quantity of tannin in the two kinds of tea is not, however, very great. A few years ago, Oudry announced the existence in tea of a crystalline, salifiable base, to which he gave the name of *theina;* but, more recently, Jobst (*Ann. a. Pharm*, XXV, 63, 1838) has asserted its identity with *caffein*, (Pereira, *op. cit.*)

It is not easy to ascertain correctly the precise effects of tea on the constitution,—separately from concomitants, in persons who are prone to use it largely and in excess. We cannot agree with Dr. Cullen in the opinion that the effects, whether good or bad, depend on the warmth and quantity of the water in which the tea is infused. Its astringency is proved not only by analysis but by its occasional use as an antidote in cases of poisoning from substances containing vegetable alkalies or emetic tartar. Hence, in cases of torpid bowels and costiveness, tea of any strength ought to be avoided, even if it be taken at all. The agreeable exhilaration of the nervous system after drinking tea recommends it to the studious, the sedentary and to those oppressed with hypochondriasis or indigestion. Dr. Johnson, who combined in himself all these qualities, was a devoted lover of tea, which he would not admit to be productive of any injurious effects on health. That it does not abridge life may be asserted from his example, but that it powerfully affects the nervous system, and like every excitant is followed by depression and gloom, is clear from the recorded feelings of this celebrated man.

In praise of tea, it is well said, that "it contributes to

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the sobriety of a nation; it imparts all the charms to society which spring from the enjoyment of conversation, without that excitement which follows upon a fermented drink. Raynal has observed that it has contributed more to the sobriety of the Chinese than the severest laws, the most eloquent harangues of Christian orators, or the best treatises of morality. The people on the continent are reverting to the habit of tea drinking, which they had abandoned during the long war, when they were shut out from the possibility of obtaining it, and therefore sought a substitute in coffee. In Holland, in Germany, and in Russia, tea is much prized, whilst even in France, where for so many years coffee was considered the only good beverage, and was used either strong or mixed with milk, according to the meal that was taken, our favourite shrub is beginning to be as much in use as long established custom has rendered it in England."—(Sigmund—*Tea, its Effects, Medicinal and Moral.*)

The sedative power of tea is alleged soon to succeed the first excitement caused by it, and hence Dr. T. Percival recommends its use in feverish and inflammatory diseases. It is more readily drunk than most beverages by the sick, but the great importance of their procuring sleep, which is the grand restorative, and the tendency of tea to produce wakefulness, ought generally to deter us from prescribing it in the above-mentioned forms of disease. Tea ought to be abstained from by the nervous, so called; that is, by those who suffer from palpitation of the heart, tremors of any kind, weakness or disturbance of any of the senses, morbid sensibility, and any notable irregularity of function. A common and unpleasant symptom or sensation caused by the frequent use of strong tea is a sinking or gnawing at the stomach

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shortly after the morning repast in which it has been used, especially if to the exclusion of substantial aliment. Vertigo and sick headache are also frequently referable to tea drinking. But, on the other hand, plethora or morbid fulness of the system, and a feeling of tension and excessive excitement of the brain are lessened by this beverage. It is opposed to a very active nutrition, and hence it is better adapted to full and fleshy habits and phlegmatic temperaments than to the thin and the nervous.

Although chemical analysis may fail to indicate any notable difference in the composition of green and black teas, and botanists are not agreed as to their being distinct species, their effects on the system are undoubtedly different. Wakefulness, tremors, palpitations, and other distressing feelings, are no uncommon results of green tea: they are much less, if not entirely, wanting after drinking black tea. Dr. Lettsom found that a strong infusion of tea introduced into the abdomen of a dog caused paralysis of the hind extremities of the animal.

Coffee (*Coffea Arabica*).—The coffee-plant is a native of Arabia Felix and Ethiopia, but is extensively cultivated in Asia and America. The varieties of coffee are distinguished in commerce according to their places of growth, but considered with reference to their physical properties, they are characterised by colour (yellow, bluish, or greenish) and size. Arabian or *Mocha* coffee is small and dark yellow. *Java* and *East India* (Malabar) kinds are larger, and paler yellow. The Ceylon is more analogous to the *West India* kinds, which, as well as the Brazilian, have a bluish or greenish-gray tint. The coffee of Mocha is generally esteemed the best, then follow the Java and West India.

The amount of export of coffee from the principal

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countries in which it is produced, is estimated by Mr. McCulloch to be 147,000 tons, of which Brazil and the Spanish Main send the largest quota, or 42,000 tons,—Cuba and Porto Rico next, or 25,000,—and Hayti 20,000. The consumption is rated as follows:—

	Tons.
Great Britain,	10,000
Netherlands and Holland,	40,500
Germany and country round the Baltic,	32,000
France, Spain, Italy, Turkey in Europe, the Levant, &c.	35,000
America,	20,500
	138,500

The average annual importation into France for the years 1830, 1831, and 1832, was nearly 11,476 tons, or 25,716,214 lbs., or not more than three-fourths of a pound for each person in that kingdom. In Great Britain, the consumption is about 22,000,000 lbs., or nearly a pound for each person in both islands. In the United States, the proportion of coffee consumed from 1834 to 1840, has been 4.7 lbs. for each person; the entire amount annually averaging during the above period of seven years, 79,833,369 lbs. (*American Almanac* for 1840.)

We are ignorant of the precise time when coffee began to be roasted and used as a drink, though the discovery is not supposed to date farther back than the early part of the fifteenth century. A public house was opened for the first time in London in 1652. The first coffee-house for the sale of coffee in France was opened at Marseilles in 1671, and next in Paris in the following year.

Coffee-berries readily imbibe exhalations from other bodies, and thereby acquire an adventitious and disagreeable odour. Sugar placed near coffee will in a short time so impregnate the berries as to injure their flavour.

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Dr. Moseley mentions that a few bags of pepper on board a ship from India spoiled a whole cargo of coffee. The *roasting* of the coffee-berry to a proper state requires great nicety; the virtue and agreeableness of the drink depend upon it; and both are often injured by the ordinary method. If it be underdone, its virtues will not be imparted, and on use it will load and oppress the stomach: if it be overdone, it will yield a flat, burnt, and bitter taste; its virtues will be destroyed; and in use it will heat the body, and act as an astringent. (*Moseley on Coffee*, quoted by McCulloch.)

Roasted coffee is, when ground, extensively adulterated (in England) with chicory. To detect the adulteration, shake the suspected coffee with cold water in a wineglass: if it be pure coffee, it will swim and scarcely colour the fluid; but the chicory sinks, and communicates a deep red tint to the water. Chicory-coffee yields a perfectly wholesome beverage; but it wants the fine flavour for which genuine coffee is renowned. The presence of roasted grain of any description may be detected by the blue colour produced on the addition of a solution of iodine to the cold decoction. Chemical analysis has not given us very satisfactory results respecting the composition and qualities of coffee. The distilled water offers traces of a *volatile oil.* Pfaff declares that the aroma of roasted coffee depends on the volatilization, or rather decomposition, of a peculiar acid, contained in raw coffee, and which has been denominated *caffeic acid.* It is probable that a volatile oil is generated during torrefaction, though it is not known what constituent of the raw coffee produces it. *Caffein* is a volatile, crystalline, neutral constituent of coffee. The decoction of coffee is coloured green by the persalts of iron, probably in consequence of the presence of *catechuic acid.*

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By the action of alkalies on a volatile principle of coffee, a green substance is produced, called *coffee green*. The other constituents of coffee are—*gum*, *resin*, *fixed oil*, *extractive*, *albumen* and *lignin*. The peculiar coffee principle constitutes 17.59 per cent. of *raw coffee*, and 12.50 of *roasted coffee*.

Raw coffee must be slightly nutritious, on account of the gum and other nutritive principles which it contains. Rasori employed it, like powdered bark, in intermittent fever; and Grindel used it, in other cases, also as a substitute for cinchona. By roasting, its nutritive principles are (for the most part) destroyed, while the empyreumatic matters developed exert a stimulant influence on the nervous system.

Roasted coffee possesses powerfully antisoperific properties; hence, its use as a drink by those who desire nocturnal study, and as an antidote to counteract the effects of opium and other narcotics, and to relieve intoxication. It has also been employed as a febrifuge in intermittent; as a stomachic, in some forms of dyspepsia; as an astringent in diarrhœa; and as a stimulant to the cerebro-spinal system, in some nervous disorders. Floyer, Dr. Percival, and others, have used it in spasmodic asthma; and Laennec (*Treat. on Diseases of the Chest*), says, "I have myself seen cases in which coffee was really useful." It is sometimes of service in relieving headache. (Pereira, *op. cit.*) Coffee is accused of causing constipation,—more generally it has an opposite effect, and its discontinuance in those who have long used it is followed for a while by constipation. This latter state may be regarded as the effect of a torpor of the intestinal canal left by the cessation of an habitual stimulus, as coffee undoubtedly is. In diarrhœa and other looseness of the bowels, coffee ought to be abstained

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from, and in dyspepsia generally, beyond the temporary relief of an unpleasant symptom its effects are detrimental, viz. thirst, heat, acidity, and sometimes gastric pains or spasms. The same remark applies to sick and inflammatory headache; nor can its use be continued without danger by those persons who desire to defraud themselves of their customary sleep, with a view to study or composition in the silent watches of the night. Pinel, in his work on Insanity, (*Alienation Mentale*,) gives cases in which this disease was brought into display by this intemperate use of coffee. Its exciting properties render its use unfit for those who are troubled with palpitation of the heart, whether it be from hypertrophy of this organ or morbid alteration of its valves. The Italian physicians speak familiarly of coffee as a stimulus, on a line with wines, as far as mere excitement is concerned; and accordingly they prohibit its use to their patients with fever or inflammatory diseases. Coffee is an enemy to the skin, and females who drink much of this infusion cannot hope to possess or retain freshness of complexion and softness and polish of skin, especially if they are deprived of the inestimable advantages of daily exercise in the open air. The nursing mother ought to be sparing in the use of this tempting beverage.

As Johnson's practice and experience are quoted in favour of tea, so are those of Voltaire in support of the liberal use of coffee. Longevity was, it is true, attained by the French author as it was by the English one; but in the nervousness and irascibility, and the weakly frame of Voltaire, we shall hardly expect proofs of the corroborating effects of coffee, any more than in the hypochondriasis, purblindness, jerks and spasms, late hours and late rising of Johnson, can we look for evidence in favour of the hygienic effects of tea.

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CHAPTER XIV.

ALCOHOLIC DRINKS.

Alcoholic and intoxicating drinks,—their sameness and effects—Alcohol, a poison, is not altered by dilution or mixture—Illustrations in opium and quinine—Different classes of alcoholic drinkers—Alliance between the wine-press and the still—Wine and spirits, their common origin—All wines exported are brandied and otherwise adulterated—Claret,—Port,—Madeira,—Sherry,—Champaigne—Alcohol a product of fermentation—Wine and beer, their alcoholic resemblance—Difference in other matters—Composition of wine, and of beer—Fermented liquors the product of elaborate art—Vinegar the natural product of the juice of the grape—Spirits—Alcohol not formed by distillation—Previous fermentation necessary—Alcohol procured from wine without distillation—Dietetic value of alcoholic liquors—Are injurious to digestion—Do not give strength, nor ability to resist atmospheric extremes and exposures—Consumption of alcoholic liquors in France—Drunkenness, and its excesses, and diseases, common in that country—Proofs and Illustrations—Consumption of alcoholic liquors in Great Britain—Deplorable results—Consumption in the United States—Amendment.

The next class of drinks to be spoken of are the intoxicating, so called on account of their effects on the brain and nervous system, or the alcoholic, thus named on account of alcohol in greater or less proportion entering into the composition of all of them. Alcohol is the intoxicating principle, found in all of them, viz. distilled liquors, wines, cider, perry, beer, &c.

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This simple and brief annunciation of the general sameness of composition and identity of effect, ought, one would suppose, at once to determine their hygienic character. If alcohol be useful at all in aid of the performance of any separate function, or of the faculties of mind and body collectively, then does it become a question as to the mode in which it is combined with other substances, so as to make its administration palatable. If, on the contrary, alcohol be, as uniform experience has proved it to be, a poison, whether applied locally to a nerve or any tissue, or acting generally on the system at large, then ought its use to be carefully abstained from, as we abstain from any other poison, except under rare and peculiar circumstances, as in disease in which poisons administered in small doses are medicines, and produce, at times, a curative effect. But in no instance, except in that of alcohol, (and its congener, tobacco,) have these curative effects following the administration of a poison in limited and minute doses, been made a ground of argument in favour of the habitual use of such poison, as a genial excitant, soother or tonic, without reference to disease being present.

Opium is often an admirable medicine to relieve pain, to procure sleep, and to banish unpleasant thoughts,—and there are cases in which its regular administration for a length of time seems to be indispensable; but yet no one argues from these effects and the occasional use of this drug, in favour of its beneficial tendency and operation for common hygienic purposes of exhilaration, or social ones of good fellowship, &c. Fortunately, its secondary effects are, for the most part, distressing, and are wisely interposed as an obstacle to its too frequent and too common use. But even if

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these secondary effects were not experienced at all by some persons, or if custom had made them less felt by others, still, neither the physician nor the moralist could justifiably recommend the habitual use of opium in every-day life. Nor would they think of advising for common and daily use, certain preparations of this poison, in which the narcotic or stupefying, and subsequently distressing effects are in a measure obviated. By whatever name these preparations may be called,—tinctures, cordials, carminatives, balsams,—in which opium is present, they will all produce effects more or less characteristic of opiate operation; and hence be deleterious to those who make daily or habitual use of them.

Precisely the same train of argument and illustration with that just offered in reference to opium, is strictly applicable to alcohol; with this difference, that for one case of disease in which alcohol in any form of combination is useful, there are a hundred cases of disease in which we derive good effects from opium. Peruvian bark, and its various preparations, have cured intermittent fevers, neuralgia, and other periodical diseases of great violence and malignity. Modern chemistry has shown, that its active medicinal principle or element is quinine; and that, however various the forms in which the bark may be administered, its efficacy mainly depends on a certain portion of quinine entering into them. This latter may be taken separately from the other constituents of the bark, as indeed is now the common practice, not only with safety but with signal efficacy. But although comparatively mild in its first effects and subsequent operation, and although it has been given in very large doses without injury, no one recommends its daily use in minute doses, or in large dilution, and ad-

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ministered with cordials and aromatics, out of gratitude for its services in disease, or with a hope that its tonic effects, manifested in certain cases of disease, will be continued from day to day in health, and when the person is in the discharge of his regular duties. In the case of alcohol, the active element in intoxicating drinks, we cannot give it pure without immediate danger to the life of the person taking it. It is a virulent poison; and yet we find persons setting up a claim for its being used from day to day, in dilution, and in combination with palatable substances, under a plea of its healthful, as well as pleasurable effects!

Opium is still opium, however disguised and modified,—quinine is still quinine, however diluted and combined by mixture with other substances. Nobody pretends, that their constant use in health, and after the circumstances which required their administration have been removed, can be beneficial or proper. Nobody believes, that their dilution or mode of combination causes any specific change in their properties, or that any modification of this kind will fit them for daily and habitual use by persons in health. It is reserved for the friends of alcohol to advance an exceptional plea in its favour, by an attempt to persuade us, that what in its purity and strength is a violent poison, becomes, by dilution and mixture, a safe and healthful beverage. The time was, still is in the opinion of many, when a dilution of alcohol, by the addition of an equal quantity of water and a slight flavouring with some essential oil, as that of barley, made it quite safe and proper. Now, however, in the opinion of an immense number of persons, this degree and fashion of dilution, being that in which distilled liquors are generally manufactured, does not prevent

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alcohol from poisoning the frame and perverting all the faculties of the mind, as poisons generally do. Whisky and brandy and gin and rum drinkers and sellers are getting out of favour, and for stronger reasons than ever yet brought a class into disrepute. But they leave behind them a large and influential body, who, whilst disclaiming against any connexion with or sympathy for them, hold very much to the same dietetic observances, by making use of the same intoxicating and poisonous element, only in smaller proportions and somewhat differently combined. These persons abjure alcohol in the proportion of 50 or even 45 per cent., as it comes in the shape of ardent spirits or distilled liquors, but they battle stoutly for the proportion of 25 down to 10 per cent. in the shape of wines. There is yet a third set at their heels, or the moderately alcoholic, who come in as plain, practical farmers, or honest manufacturers and labourers, and who quietly assure us, that they will be content with alcohol in drinks at the low rate of from 9 to 1½ per cent., in the shape of cider and beer.

All these three divisions are, however, in fact, arrayed in the same cause and adopt the same banner, though with different devices; and they resemble much more different divisions of the same army than opposing forces. They all procure alcohol from the same source, and by the same primary process, viz. of fermentation. The manufacturers of ardent spirits have contrived to procure it in greater abundance by distillation from fermenting mixtures; but, in requital, they give back a portion to the makers of wines, in order to strengthen these latter liquors, and adapt them to the still prevailing tastes for something rather more potentially alcoholic. Between the Wine-press and the Still there is then a close and almost inseparable connexion, and so long as the former is

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in active operation the latter will never be idle. From wine is educed Spirits of Wine, as alcohol is often called. Of the 924 millions of gallons of wine made in France, it will be remembered, that more than a seventh or 141 millions were manufactured into brandy (p. 223); a portion of which is used in giving more body to the wine that is reserved for exportation. Nor is French brandy alone used for this purpose. Mr. McCulloch, in speaking of the Catalonian wines, tells us that the exports from Barcelona to Cuba, are 12,000 pipes of wine and 3000 pipes of brandy; to South America, 16,000 pipes of wine and 6000 pipes of brandy; to the North of Europe, 2000 pipes of wine and 2000 pipes of brandy. So that for every three pipes of wine, there goes with it more than a pipe of brandy; both of them the product of the juice of the grape. The author just cited, adds: A good deal of brandy is sent to Cadiz and Cette; most part of the former finds its way into the wine vaults of Xeres; and the latter being conveyed by the canal of Languedoc to the Garonne, is used in the preparation of the wines of Bordeaux.

Claret is not a simple wine or the produce of one kind of grape, or even one vintage; but is a mixture of Bordeaux and Bene Carlos; sometimes Languedoc and Bordeaux; at others, Hermitage or Alicant with Bordeaux; and uniformly a portion of brandy is added to it, in the proportion of six per cent. For more than a century the Portuguese have ceased to send pure port wine to England. Redding, from whose work (on Wines) I derive the preceding account of the mixture and adulteration of Bordeaux wine, says of Port, in reference to its preparation for the English market: "They did not spare brandy in the operation, nor elderberries, nor burnt corn, nor any thing that would answer to colour the wine, when it was not thought deep enough. They created at length such a wine as the world never before saw, especially when *improved* by subsequent adulterations in London, where the imitations of port wine have been found to be so facile, in consequence of the absence in most of that imported of the prime qualities of good wine, that a vast quantity more is sold than Oporto, with its company, has ever been able to export." And again, "Five-eighths of the wine brought to England is so coarse, and is such a medley of ill-flavoured heterogeneous vine produce, bad Portuguese brandy, and other matters, that any ingenious person may increase one pipe to three, by the addition of inexcusable articles, without any fear of injury to the stomach of the consumer, or to the appearance of the wine happening." Mr. McCulloch, not prone to extravagance of calculation or opinion, says on this subject: "A large quantity of brandy is always mixed with wine shipped from Oporto for England. Genuine unmixed port wine is very rarely met with in this country."

Of *Madeira wines*, Redding says, "Brandy is not allowed to be imported into Madeira, even from Portugal; that which they require they make themselves. For what object this prohibition exists, it is difficult to tell, as the wines of Madeira always receive an admixture of brandy on exportation, the growers say, to enable them to bear the long sea voyages to which they are subjected." To the same purport, Mr. McCulloch informs us, that, "though naturally strong, they receive an addition of brandy when racked from the vessels in which they have been fermented, and another portion is thrown in previously to their exportation."

But not only are all the exported wines brandied, but they are also, at home and in England and in this coun-

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try, adulterated after various fashions. "When Madeira was a fashionable wine in England, every sort of deception was practised with respect to it, and large quantities of spurious trash were disposed of for the genuine vintage of the island. This naturally brought the wine into disrepute, so that sherry has been for several years the fashionable white wine. It is difficult, however, to imagine that adulteration was ever practised to a greater extent upon Madeira than is now practised upon sherry." (McCulloch.) We have seen already that sherry is duly brandied by Catalonian brandy. That it is otherwise adulterated, is affirmed by the writer last quoted, who, in another place remarks: "Perhaps no wine is so much adulterated as sherry." In England, as we learn from Redding, "sherry of the brown kind and of low price, when imported, is mingled with Cape wines and cheap brandy, the washings of brandy casks, sugar-candy, bitter almonds, and similar preparations, while the colour, if too great for pale sherry, is taken out by the addition of a small quantity of lamb's blood, and then passed off for the best sherry, by one class of wine sellers and advertisers. The softness of good sherry is closely imitated."

Large quantities of what is miscalled claret, is manufactured in England, for making which, as well as *improved* claret of prime character, many recipes are extant.

Champaigne is everywhere manufactured, to meet the existing demand in Paris, in London, or in the United States. Not one bottle in a hundred of that which is drank in England and this country, comes from Champaigne. "The ignorance of many persons of the true taste of Champaigne, has of late caused the importation of a wretched and cheap manufacture from

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the continent, which is sold for the genuine article, but still larger quantities of a fictitious wine, under the same name, have been made here (in England) of common ingredients, and passed off at public places. Balls, races, masquerades and crowded public dinners, are profitable markets for adulterated wines."

I the more readily quote from Redding, as he is an amateur of wine, and not inclined to underrate its virtues. Henderson, whose volume is before me, bears testimony to the same effect; and I might, if necessary, adduce multiplied proofs from other sources, of the extent to which the mixture of distilled spirits, and especially brandy, and the adulteration by the mixture of other and deleterious substances, are carried, in preparing nearly all the known, certainly the most celebrated wines for market. One inference is clear, that whoever drinks the wine which is commonly brought to table, most certainly drinks brandy with it. And there is a strong probability besides, that he also drinks, at the same time, an adulterated compound, which, in addition to the double supply of alcohol in it, contains ingredients injurious to the stomach and to the system generally. The wine drinker in Great Britain and the United States goes beyond the grog drinker: the latter takes simply spirits and water, whereas he takes spirits and wine. By the standard of temperance, it will not be difficult to decide their respective merits; on the score of health, I would rather run the chances of the drinker of spirits and water, than of him who drinks spirits and wine. The probable longevity is in favour, as far as my observation and reading extend, of the grog drinker. But from the imitation of either, we ought all devoutly to exclaim, "Good Lord deliver us!"

The assertion, once made with some confidence, that

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alcohol is in a peculiar state of combination in fermented liquors, and only becomes free by distillation, is entirely unfounded. The formation of alcohol is the direct, indeed inevitable result of fermentation; a process which takes place by a combination of sugar with water and a portion of ferment or yeast, in a temperature of from 68 to 77 degrees of Fahrenheit. I have already described the phenomena manifested during panary fermentation, viz. the swelling up or rising of the substances mixed, and the formation and evolution of carbonic acid and alcohol. Starch kept in a moist state for some time, is gradually converted into sugar, and subsequently, by fermentation, undergoes changes similar to those just mentioned. It is by a process like this last, that certain grains, such as barley, which consist mainly of starch, on being malted, evolve saccharine matter, and are then fitted for fermentation and its consequent products, alcohol and fixed air.

Analogous changes take place in the juices of certain fruits, such as grapes, which have in themselves all the required materials for fermentation, viz. sugar, and ferment and water, when the other condition of adequately elevated temperature is complied with. But in all these cases, the alcohol did not pre-exist or form a constituent element of the substances, by the mixture and working of which it was evolved. It did not exist in the sugar, nor in the starch nor malted grain, nor in the grapes, nor in their fresh juice. So long as the skin and the cells in which the juice is contained are entire, and exclude the air, the fruit will not ferment. Nor will the expressed juice or *must*, as it is called, ferment, if it is carefully excluded from the air. Even when it is heated in close vessels, to the temperature of boiling water, or 212° F., it will not undergo any fermentative change, but it may

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be preserved in this state for years, without, however, losing its property of fermenting.

In the case of the fermentation of *wort* or an infusion of malt, the gluten which is contained in the grain serves as a ferment to the other or saccharine portion, and water, just as leaven did to the paste in the making of bread; and the result is beer, with its proportion of alcohol and carbonic acid. Wort ferments by the addition of yeast, but after its decomposition is completed the quantity of ferment or yeast is found to be increased by thirty times more than it was originally. The additional quantity comes from the gluten. Yeast from beer and that from wine, examined under the microscope, present the same form and general appearance. They are both acted on in the same manner by acids and alkalies, and possess the power of producing fermentation anew in a solution of sugar; in short, they must be regarded as identical. Wines and malt liquors, therefore, it will have been seen, resemble each other in their being, both of them, the product of sugar with water, decomposed by yeast or a fermentable principle, gluten. In all of them, alcohol and fixed air are formed. Wine is the manufactured liquor of the juice, but by no means the juice itself, of the grape. Ale and beer are the manufactured liquors of barley, which has undergone the process of malting. But in addition to the exhilarating principle, carbonic acid, and the inebriating principle, alcohol, both common to these and to all fermented liquors,—although as regards the acid, it is allowed to escape in many wines,—there are other principles on which their distinctive flavour depends.

The juice of the ripe grape consists, according to Proust, of *extractive matter*, *sugar*, *gum*, *glutinous matter*, *malic acid*, *citric acid*, and *bitartrate of potassa*,

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(cream of tartar.) Bérard, in addition, found *malate of lime*, and *supertartrate of lime*, but no citric acid,—and in place of extractive, he reports *odorous matter*. The chief constituents of wine, in addition to alcohol and water, are tartaric or malic acid, extractive matter, and an odorous principle, to which the name of œnanthic ether has been given. All the constituents of wines, but seldom, if ever, found in any one wine, are, according to Gmelin, (*Handb. d' Chem.* II. 1255,) as follows: ALCOHOL, *an odorous principle*, (volatile oil?), blue colouring of the husk, (in red wine,) *tannin, bitter extractive, sugar*, (especially in the sweet wines,) *gum, yeast, acetic acid*, (from the commencement of the acetous fermentation,) *malic acid, tartartic acid, bitartrate of potassa, bitartrate of lime, sulphates and chlorides, phosphate of lime, carbonic acid*, (especially in the effervescing wines,) and *water*. To these may be added the *paratartaric acid* or *racemic acid*. (Pereira, *Op. cit.*)

Malt liquors (*ale, beer and porter*,) contain a larger quantity of extractive and mucilaginous matters derived from the malt out of which they were made than wines. The proportion of these matters, compared with the nutritive ones in the barley, or even the malt, before it was brewed, is very small. The loss by malting and brewing, is represented to be seventy-five per cent. The average quantity of extractive matter contained in a pint or sixteen ounces of North River ale was 816 grains, or one-eleventh of the whole weight. This gave nearly nine ounces of solid matter to the gallon.* Owing to the presence of mucilaginous and extractive substances in

* Bacchus—An Essay on the Nature, Causes, Effects and Cure of Intemperance, by Ralph Barnes Grinrod—edited by Dr. Lee, of New-York, 1840. A very valuable work, even apart from the temperance argument.

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malt liquor, they always contain a free acid, and are greatly disposed to pass into the acetous fermentation, or that process by which vinegar is formed. The sour taste in malt liquors is corrected partly by free sugar, or that which has not been decomposed by fermentation, and partly by the bitter flavour of the hop, the presence of which diminishes the tendency to the formation of an acid.

Fermented liquors have been spoken of as the result of a natural process, themselves almost as a gift of nature for which we ought to thank Providence. This is a fallacy. Fermentation and the evolution of alcohol are the natural results of combinations already detailed: these combinations may be formed naturally, but if so, they are in a very limited degree, and subject to so many interruptions that they would scarcely amount to anything. The making of beer and the making of wine are both of them a highly elaborate and even complicated manufacture. Among the many stages in the art of brewing, are those of grinding, mashing, hopping, boiling, cooling, cleansing, fining, attenuation, &c., in each of which the greatest care and caution are requisite on the part of the brewer, or an imperfect liquor is the inevitable result. In the manufacture of wine, there is the pressing, working, or fermentation in the vat, drawing off the new made wine into casks, or first racking, second racking, by being put into other casks, sulphuring by burnt matches or exposure to sulphurous acid in the cask, to render the glutinous matter incapable of re-exciting fermentation, clarifying and fining. After being cellared, new cares are given to rendering it fit for market, such as to fill the casks after the carbonic acid has ceased to escape.

If the juice of the grape were left to its natural

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changes, it would pass almost directly from the vinous fermentation, by which it is converted into wine, to the acetous fermentation, by which it is changed into vinegar. This last is really the natural product of the juice of the grape, and more entitled to be thus called than wine is.

Alcohol is in larger proportion, but not differently combined in spirituous liquors, or spirits, as they are called by British writers, than it is in wine. It is combined with water and some peculiar essential oil, from which the flavour is more particularly derived. At one time it was believed, and the opinion is probably yet held by those who are ignorant of chemistry, that alcohol is fixed or latent, as it were, in fermented liquors, and is evolved, and becomes free alcohol, by means of the heat of distillation alone. So far from this being true, we know now, that alcohol is generated by fermentation, and by fermentation alone, and that it is only procured in a more concentrated state by the distillation of fermented fluids, or of substances with water in a state of fermentation. If distillation could develop or evolve alcohol, *must* or grape juice mixed with water, ought, when put into the still, to furnish this principle; but, in fact, the only product is a mere tasteless vapour. So soon, however, as the must is fermented and poured into the still, it yields readily alcohol in large proportion. The cake, or residue of grapes after they have been pressed, sometimes called *murk*, mixed with water and then fermented, will yield alcohol by distillation: but if it were distilled before fermentation had begun, no spirits of any kind would come over. So likewise, in the case of grain, if the *wash*, as the mixture of ground malt and rye, barley, or oatmeal with water is called, be subjected to distillation, no spirits are produced: the mixture, or wash, must be subjected to a moderate heat, and exposed

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to the air by repeated stirrings, until it ferments and acquires a vinous smell. It is then fitted, when put into the still, to furnish spirits, or alcohol and water.

The origin of alcohol, and the relative share which fermentation and distillation have each, respectively, in furnishing it, are well expressed by Dr. Ure, in his *Dictionary of Chemistry*, art. *Alcohol.* "As we are not able to compound alcohol from its ultimate constituents, [carbon, oxygen and hydrogen,] we have recourse to the process of fermentation, by which its principles are first extricated from the substances in which they were combined, and then united into a new compound; to distillation, by which this new compound, the alcohol, is separated in a state of dilution with water, and contaminated with essential oil; and to rectification, by which it is ultimately freed from them." The last stage is the conversion of common proof spirits into alcohol, for use in the arts, the only one to which alcohol, in any shape, is, with few exceptions, applicable.

Farther and conclusive proof of the sameness of the mode of combination of alcohol in wine and spirits, is found in the readiness with which it can be procured from wine without distillation. Mr. Brande first showed how this could be done. By adding sugar of lead (subacetate of lead) to the wine, the acid and extractive colouring matters were thrown down or precipitated, and then, by the farther addition to the clear liquor of dry carbonate of potassa, the alcohol rose to the surface, leaving the heavier water, with the potassa in solution, in the lower part of the glass tube in which the experiment was made. The same fact has since been established by Gay Lussac, who procured alcohol from wine by distillation *in vacuo*, at the low temperature of 60° F. The mere removal of the pressure of the atmosphere was sufficient, in this case, to allow of the alcohol separating and rising from the wine or rather the water, with which latter and the extractive colouring matter and volatile oil and acid, it was combined to form wine. After these and other experiments of the like conclusive nature, we are fully warranted in saying, with Dr. Turner, that, in all spirits, such as brandy or whisky, the alcohol is simply combined with water; whereas, in wine, it is in combination with mucilaginous, saccharine, and other vegetable principles.

It becomes the more necessary to establish, beyond denial, the fact, not only of the identity of the intoxicating principle in all spirituous and fermented drinks, but of its mode of union or combination being the same in all, in order to enable us to ascertain, by a common standard, the proportionate quantity of intoxicating drinks used by the people of different countries. In the case of vegetable food, eaten in different and remote parts of the world by the people, I showed that, however various the sources of supply,—some being from grain, some from pulse, others from roots, and others, again, from the matter contained in the wood of certain palms, —there was one common principle which they all contained, and on which much of their nutritive properties depended. This is fecula, or starch. So, in the case of intoxicating drinks, we find, in all their varieties, by whatever name they may be designated, and in whatever esteem held, there is one common principle, that on which their intoxicating and chiefly noxious properties depend. This is alcohol.

Dietetic value of Alcoholic Liquors.—One of the claims most strongly urged in favour of alcoholic liquors as drink, is that they aid digestion both directly and by correcting disorders of this function. There is not a

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particle of proof of this allegation, which, on the contrary, is opposed to chemistry, physiology, and general observation and experience. The end and object of digestion is, *first*, the solution of the food, since nothing can be taken up by the absorbent vessels, by them to be carried into the blood, which is not in solution; and *secondly*, the reduction of the different ingredients of the food, already enumerated, into the most simple material of the animal processes, namely, albumen, which is found to be contained in the fluid resulting from the digestion of the food, partly in the state of solution and partly in globules. This, with slight additions, is the clear statement of the case by Müller. (*Elements of Physiology*, p. 479.) Let us see, next, how far alcohol or alcoholic liquors contribute to fulfil the indication laid down. Has it any reducing property, such as water has and weak acids have, when aided by heat? So far from this, alcohol coagulates albumen and hardens the muscular fibre, and does not dissolve casein. It is on account of its being opposed to the reduction of animal matter, either into a homogeneous pulp, such as is required for its conversion into chyme, or into a homogeneous fluid, as we see in chyle, that alcohol is employed by anatomists and naturalists to preserve animal substances and objects in natural history unchanged.

Digestion, or the conversion of food into the somewhat homogeneous, pulpy mass, called chyme, is brought about in the stomach by water, by warmth, and by an acid, the muriatic, and sometimes by another, the acetic, mixed with some mucus. Alcohol is no ingredient in this mass, is no part of the secretion from the stomach, or of gastric juice with its acids and mucus. Its presence, by introduction from without, retards the change or reduction of the several articles

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of food into chyme, and consequently interferes with, by retarding, the farther change or conversion of the fluid portion of this chyme into chyle, or the materials of chyle, which soon becomes blood. The chief component parts of chyme are albumen and casein, to the solution of both of which alcohol is opposed.

Farther observations made, of late years, on the gastric fluids, by Eberle, Schwann and Müller, all German physiologists, have almost rendered it certain, that the active animal matter in gastric digestion is a modification of mucus, termed *pepsin*, or the digestive principle. The activity in pepsin is increased by its solution in acids, and they cause a change in substances analogous to that of digestion in the stomach. The combination of pepsin and acid seems indeed to be necessary for digestion. Very different is the case with alcohol. Müller says expressly, "alcohol and the boiling temperature render the digestive principle inert." It may be replied to these and some preceding observations, that it is pure alcohol on which the experiments were made; and that, in common drinks this fluid is greatly diluted. This objection, however, at the very farthest, is merely in extenuation; alcohol, as far as it reaches the particles of food in the stomach, retards digestion; and if not greatly deleterious when drunk in the shape of spirits, wine or beer, this is owing to the smaller quantity, but not to any change or modification of its mischievous properties.

In confirmation of these chemico-physiological views and experiments, we have direct proof, derived from the changes which have been noted in the stomach of a living person, after drinking alcoholic liquors. Many of my readers have heard of the man who received a wound, which, though it healed, left an open-

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ing into his stomach, so large that a portion of the cavity of this organ could be examined by another person at will. Dr. Beaumont had this man in his keeping for a long time, and made a great many exceedingly interesting and valuable experiments on him, in illustration of digestion generally, as well as of the relative digestibility of different artcles of food. Want of time and space prevents me from noticing many of these, which are recorded by Dr. Beaumont in his *Experiments and Observations on the Gastric Juice.* Among his observations were those respecting the effects of alcoholic drinks on the stomach and digestion of this man (Alexis St. Martin). He found, that they invariably interfered with the regularity and completeness of digestion; and, in reference to the morbid appearances of the mucous or lining membrane of the stomach, he tells us expressly: "The free use of ardent spirits, wines, beer, or any intoxicating liquor, when continued for some days, has invariably produced these morbid changes," p. 239. There are not always unpleasant feelings nor even diminished appetite at first, with these diseased states of the stomach; and hence, a person will deny for a while that he suffers from his alcoholic potations; but, ere long, disease manifests itself in various ways, and by various symptoms, many of which indicate disorder of parts remote from the stomach, although the injury done to it was the primary and the chief cause.

Equally fallacious with the belief of alcoholic liquors aiding digestion, is that of their efficacy in enabling those who drink them to encounter more fatigue, and to incur greater exposures of temperature and weather generally, than they could otherwise do. The very reverse of all this is true. The recorded experience of

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men in all situations and climates,—under all kinds of labour and exposure, prove that abstinence from these drinks gives increased ability to go through the labours of the farm and the workshop, to resist heat and cold, and to encounter hardships on sea and land, beyond what has ever been done under the unnatural excitement of alcohol, followed, as it always is, by depression and debility, if not by fever and other diseases. The observations of naval and military surgeons and commanders are now pretty uniformly to the same purport, and their testimony is adverse to the issue of rations of spirits, or of alcoholic drinks generally, to men in the army and navy.

As respects the common use of wine, the subject is thus briefly yet clearly and pertinently dismissed in a few words by Dr. Pereira:—"To persons in health, the *dietetical* employment of wine is either useless or pernicious." As a *medicinal* agent it must be directed by a physician with a knowledge of all the circumstances in the case of his patient, and of the composition, properties and effects of wine, similar to that which is expected of him in the prescribing other medicines. He must not evade his heavy responsibility under the cover of poetry or jest, or in compliance with fashion or the appetite of his patient. If he have studied the effects of vinous liquors, he will have learned that they keep up, if they do not bring on, gout, rheumatism, disorders of the stomach, and of the kidneys and skin; and that the change from one kind of wine to another is only a change in the morbid agent.

Malt liquors, though of less alcoholic strength than spirits and most wines, are capable of causing drunkenness, and this is quite a common effect of their use in England. At first apparently more favourable to nutri-

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tion than the other classes of alcoholic liquors, by the fulness and corpulency of frame which they induce, they are found to be after a while adverse to a ready and active discharge of the functions. The brain suffers, and the faculties are dull and sodden, or apoplexy strikes down the beer-bibber: the heart suffers, and there is hypertrophy and retarded and irregular circulation, and danger of sudden death from this cause; the lungs suffer, and there is congestion, pneumonia, and not seldom dropsy of the chest. Other forms of dropsy also succeed to the free use of malt liquors, which kill more speedily, and with preceding symptoms of greater degradation—reduction of man to the mere brute, than even after the habitual use of ardent spirits. Some of the English writers, while they admit and deplore these deleterious effects of drinking malt liquors, attribute them to adulteration. They add, however, that the taste of the people generally is so vitiated by the adulterated, in fact poisonous beer and ale and porter, that even if the brewers were all honest, they would not find customers for their purer liquors.

A slight retrospect of the history of beer,—barley-wine, as it was called by the Egyptians,—will show, that long anterior to modern inventions, by the introduction into it of *cocculus indicus*, or Indian berry, *black extract*, or this berry with opium and other ingredients, *nux vomica*, or *St. Ignatius's bean*, *henbane*, *extract of poppies*, *copperas*, *capsicum*, *wormwood*, *aloes*, *quassia*, &c. &c., this favourite English beverage was also a highly intoxicating one. The Germans in the time of Tacitus could get drunk on beer, and fight, and shed each other's blood, very much in the same fashion in which our North American Indians enact similar scenes under the delirium caused by whiskey and rum. German bravery was of no avail against a foreign foe, when subdued by drink; and in this state, as when the Marsi were surprised by Germanicus, they became an easy prey to their disciplined and vigilant enemies, the Romans.

The descendants of these people, the Anglo-Saxons in England, did not abate much in their convivial and intemperate habits kept up by beer: and we may suppose that the revelry and dissipation in Harold's camp on the night preceding the fatal battle of Hastings, was maintained by potations of the national beverage.

In our climate, even more than in that of England, the habitual use of malt liquors is decidedly injurious. The free acid, though partially disguised to the taste, is detrimental to digestion, and to all the assimilating functions; it is particularly inimical to the skin and the kidneys.

In conclusion of this part of my subject, I shall submit a few estimates of the consumption of alcoholic liquors in Great Britain, France, and the United States. They will surprise, I know, many of my readers, who are little prepared to find that drunkenness and all its vile and wretched concomitants, prevail to an extent in France hardly exceeded by those which are so well known to exist in Great Britain and the United States.

In France, the intoxicating liquors used are wine, cider, beer and brandy. I have not an estimate for 1830, of the consumption of all these articles; that of cider and beer being of anterior date, viz. the former as given by Baron Dupin, in 1825, and the latter by a French Medical Journal for 1829. The manufacture and consumption of both of these drinks have, however, probably increased since the above dates, so that in giving the returns from the sources indicated, we keep

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within the amount used in 1830. I have selected this year on account of the estimate of the manufacture, consumption and sale of wine, as given in page 228, being for that period. The several kinds of intoxicating drink, and the quantities of each respectively drunk in France, in 1830, are as follows:—

	Gallons.
Wine, - - - - - - - - -	611,466,000
Cider, - - - - - - - - -	234,121,000
*Beer, - - - - - - - - -	124,000,000
†Brandy, from wine and murk, - - -	15,074,000
Brandy, from cider, cherries, potatoes and grain, -	2,890,800‡
Alcoholic drinks of all kinds, - - - -	987,551,800

* In the above estimate of the quantity of beer drunk, I have taken the mean of Baron Dupin's statement, which is about 93,000,000, for 1823, and of the French Medical Journal for 1829, which is 155,000,000 gallons.

† Redding gives, from a French official document, the amount of brandy made from wine and the murk, in the several departments in France, which is 821,960 hectolitres. From this must be deducted the amount exported; but as I find no return for 1830, I have made an estimate deduced from the amount exported in 1828, as given by McCulloch, with the remark, that it has since decreased considerably. The export, in 1828, was 403,207 hectolitres; in 1827, 273,574 hectolitres; in 1826, 194,110 hectolitres. Now if we give the exportation for 1830, at 250,000 hectolitres, we shall probably be in advance of the actual amount. Were I to take Dupin's statement as the basis, being the yearly average from 1819 to 1823, the estimate of consumption would be much higher than that which I have adopted. He does not give the quantity in brandy, but he does in pure alcohol, which is 560,988 hectolitres, from all sources, wine, cider, &c. If we suppose that brandy has fifty per cent. of alcohol, and the analysis of Brande makes it fifty-three, then this amount in alcohol will represent 1,121,976 hectolitres, from which, deducting the quantity exported for 1823, viz. 310,059, and there would remain for home consumption, 811,917 hectolitres, or 21,416,000 gallons of brandy.

‡ Dupin.

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M. Dupin's estimate is higher than mine in the preceding statement, since he supposes the quantity of intoxicating drinks consumed in France to be at the rate of forty-two gallons per individual, whereas, according to my estimate, the rate will not be much more than thirty gallons, taking the population at thirty-two and a half millions, in 1830.

Surprise will be felt by many at the quantity of beer consumed in France. As a memorandum which may aid to remove doubts on this head, it is worth while to note, that in 1824, the excise duties on beer in that country, amounted to 9,252,300 francs, or about 1,800,000 dollars. The chief manufacture, both of beer and cider, is in the northern part of France, and where also these drinks are chiefly consumed.

In order to enable us to institute a comparison between the habits of the French and those of other people, as respects their use of intoxicating drinks, we must reduce these to a common standard, which is done by exhibiting the quantity of alcohol in each kind. Beginning with wine, I shall take the rate, adding a small fraction, adopted by M. Dupin, at least that which corresponds with two data laid down by him, viz. the quantity of wine distilled, 5,217,753 hectolitres, and the product in alcohol, 459,817 hectolitres, which would be at the rate of 8.8 per cent. According to Mr. Brande, the wines of Burgundy have from eleven to sixteen per cent. of alcohol, those of Champaigne, from twelve to fourteen, Claret (average) 15.10; but on the other hand, the common country wine (*vin de pays et vin ordinaire*), will hardly average more than four to five per cent. The alcohol in cider, I shall estimate at seven per cent. being somewhat below the average given by Mr. Brande, who makes the analysis of two specimens,

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at 9.87 and 5.21 or 7.84. As respects beer, it is not so easy to establish a rate applicable to the varieties of strong and weak or small beer. But as more than four-fifths of the entire quantity of malt liquor made in France is, according to M. Dupin's statement, strong beer, I shall take five per cent. as its proportion of alcohol. Mr. Brande's analysis averaged for the four kinds of strong beer 6.30 per cent. For brandy, my estimate will be fifty per cent. of alcohol; Mr. Brande makes it fifty-three. The sum total of alcohol in the different drinks used by the French people will, therefore, be as follows:—

Gallons.		Gallons of Alcohol.
In 611,466,000	of wine, at 9 per cent. is - -	55,000,000
234,121,000	of cider, at 7 " - - -	16,388,470
124,000,000	of beer, at 5 " - - -	6,200,000
17,954,800	of brandy, at 50 " - - -	8,982,400
987,551,800,	averaging 8.7 per cent. - - -	86,570,870

This will give more than 2½, or 2.66 gallons of pure alcohol, mixed up in various drinks, for every individual in France. The quantity used in the arts and manufactures is not, I believe, known; but if we were to give the surplus of the two gallons and a half, or 5,320,870 gallons, to these purposes, there would still be a fearful exhibition of the quantity of alcohol drunk in France. To gain an approximation to the amount really consumed by the persons who chiefly drink intoxicating liquors, we must deduct from the entire population one-third, being of children under twelve years of age, who are generally, we must hope, not consumers of these drinks; and of the remainder, we may suppose that one-half, or the women are in the same state. This, I know, is being more gallant to the

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sex than accurate in the fact; for many of the women drink, and get drunk, and are in insane asylums on this account. But we will suppose the women exempt, and there remain about ten millions and a half of males, of all ages over ten years, who, if we take eighty-one millions two hundred and fifty thousand gallons as the entire amount, after deducting what is used in the arts, consume alcohol, at the rate of 7.7 gallons annually per man,—distributed through various kinds of drinks.

After this melancholy exhibition of the statistics of alcohol for France, the traveller who has lounged along the boulevards at Paris, and travelled thence post to Italy, will exclaim with amazement,—how is it, that, notwithstanding this immense consumption of intoxicating drinks by the French people, they should still be so temperate? The question then directly comes up, are they temperate? What is the experience of those persons who mix with the people in their fêtes,—who look into their cabarets or small wine and brandy shops,—who watch the crowds returning into Paris of a Sunday evening from outside the barriers, where they get wine cheaper than in the city,—who visit their hospitals, to note the causes of disease and of surgical injuries; and to make a record of their insane, and the causes of this disease,—who read the newspapers, and learn in them the origin of quarrels and duels between soldiers at a cabaret, and of disobedience of the men to their officers? With facts derived from these various sources, except the inspection of cabarets, I made myself acquainted during a twelvemonth's residence in Paris. I there found cause to modify very materially my former opinions of the temperance of the people of Paris, if not of France gene-

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rally. Farther inquiry and reading have extended my knowledge on this subject,—but in a melancholy way, for they have made me cognizant of the startling fact, that drunkenness is becoming, has in many parts of France become, as much a national vice as it was, and still, alas! greatly is, in the United States and the British empire. How indeed could it be otherwise, with the immense consumption, by the French people, of all kinds of alcoholic or intoxicating drinks. Some of the features of this moral blight have been presented to the reader, on page 79 of this work, when the habits of the labouring classes in Nantz and Brest, and the farmers from the country around, were depicted.

M. Villermé, who certainly is too much accustomed to statistical inquiries to indulge in speculation or exaggeration, and has too lofty a patriotism to be a detracter of his countrymen, says, that drunkenness is the greatest curse of the labouring classes in France. The workmen or operatives drink spirituous liquors, he tells us, at first without pleasure, and merely through imitation; soon to indifference succeeds an agreeable sensation; then an irresistible desire is felt, and a passion continually augmenting.

"It is thus that, gradually, and often by a rapid descent, a man passes from habits of sobriety to habits of intemperance, from the moderate use of intoxicating drinks to their abuse. Henceforth, everything becomes an occasion for the operative to visit the tavern, (*cabaret:*) he goes there when times are prosperous, because he gets high wages and has money; when he is for a while without work, because he has nothing to do; when he is happy, in order to enjoy himself; when he has domestic troubles, in order to forget them. In fine, it

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is at the tavern that he contracts debts, that he pays them when he can, that he makes his bargains, that he contracts his friendships, &c., and that even he gives his daughter in marriage." After describing the waste, idleness, indigence, turbulence, debasement, disease, shortening of life, vices and crimes which drunkenness brings in its train, M. Villermé adds: "We may affirm, that drunkenness is truly the chief cause of the quarrels, of a great number of crimes, and of nearly all the disorders and irregularities which the operatives commit, or in which they take a part." (*Ann. d'Hygiene*, &c. T. XXII., *and Eclectic Journal of Medicine*, Vol. IV. p. 253–5.) Chevalier, in his treatise on "The Prevention of Diseases among Printers," states, as the chief means, dissuasion from the excessive use of intoxicating drinks, and from frequenting petty taverns and pot-houses. Among the articles of advice which he suggests should come from the master-printers to their compositors and others, is to explain to them the dangers of intemperance in drink, or in any other indulgence. Among the considerations which he presses on the attention of the workmen themselves, is to live in a becoming manner, and temperately; avoiding debauches, sometimes of days' duration, to be atoned for by excessive labour and insufficient food. (*Ann. d'Hyg. Pub.* T. XIII.; *and Eclect. Journ. Med.* Vol. IV. p. 71–2.)

After these statements of their own writers, the French people will not, probably, feel themselves scandalized by the following extract from the work of Mr. Bulwer, (Monarchy of the Middle Classes, Vol. I. p. 119,) who, by the way, generally describes France in as favourable a light as possible. It is in reference to the workmen and operatives of Paris. "Hatters—drunkards; tailors—vicious and dissatisfied; nappers

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and cotton spinners—so wretched that no fault should be found with them; cabinet-makers—fond of drinking, but of quiet tempers; printers and analogous trades—drinkers; house-painters—drunkards, very careless; marble cutters—drinkers and hot headed; workmen in harbours—exceedingly addicted to drinking; curriers—drunkards in the highest degree."

M. Villermé, in his essay, does not restrict his observation to the operatives of Paris, but mentions those of Rouen, Saint Quentin, Lille, Rheims and Rhetel, as addicted to drunkenness. M. Villermé suggests various remedies for this wide-spread evil of intoxication, among which are appeals to the rational philanthropy of the proprietors and master-manufacturers combined with the efforts of the clergyman and the magistrate. He notices, in order to correct it, the mistaken opinion, that it is easier for a person to moderate the quantity of an accustomed stimulus than to forego its use altogether. Reformed drunkards seem to agree that such is not the case: the entire withdrawal is easier to bear than the limited allowance. The position, therefore, continues the French author, of the American Temperance Societies, is founded on just grounds,—*that entire abstinence from intoxicating liquors is the only certain remedy against intemperance.* M. Villermé, in speaking of Temperance Societies in France, does not seem to be very sanguine of their success. "I consider (he says) *the religious spirit of the United States as a powerful element in the success of temperance societies, which does not exist in our population.*"

Reference has been made to insanity in France, produced by intoxicating liquors. The proofs of the fact are in the statistical reports of her own physicians.—It appears that, of 256 persons, received in the hos-

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pital at Charenton, near Paris, who were insane from physical causes, during the years 1826, 1827 and 1828, 64, or one-fourth of the whole, had become so in consequence of excess in the drinking of wine, (*abus du vin.*) Of these, there were twelve females.* In the insane asylum at Caen, M. Vastel reports nineteen patients, whose disease was brought on by intoxicating drinks, (*liqueurs fortes,*) of whom three were females. The whole number diseased from physical causes, was 51, and from moral causes, 109—total, 160. So that, of the insane from all causes, the proportion from drunkenness or its equivalent excesses, was as one to every eight and one-half. M. Vastel refers to the returns at Charenton, of whose inmates, he says, the proportion from drunkenness is one-tenth of the entire number; and he also repeats the results of M. Pinel's experience to a similar purport, viz. that out of two hundred and sixty-four cases of insanity, he noted twenty-six as the effect of the abuse of spirituous liquors. (*Ann. d'Hyg.* &c. T. VIII.)

It may be alleged, that, as there is more drunkenness in the northern than in the southern portion of France, the inference in favour of the region of the vine ought to be favourable; but I have already stated that, although the people in the south are the *producers*, yet the people of the north, and especially the inhabitants of cities, are the *consumers*. I have already exhibited the state of the producers of wine as anything but enviable. We can now see how far that of the consumers is better, or entitles them to be held up as an example to the people of

* The reader, desirous of farther details and illustrative arguments on the whole question of the effects of intoxicating liquors, is referred to the Anniversary Report of the Pennsylvania Temperance Society, (with a copious appendix,) for 1831—prepared and read by the author of this work.

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the United States, in favour of the cultivation of the vine, with a view to the manufacture of wine—and brandy, for the two go together.

The alcoholic and intoxicating drinks consumed in Great Britain and Ireland are comprised under the heads of beer, cider, spirits, and wine.

It has been already stated in a former chaper, p. 124, that the quantity of beer of all kinds manufactured in Great Britain and Ireland in 1830, was upwards of nine millions and a half of barrels, or 322,000,000 gallons, of which the proportion made in Ireland would be about a million of barrels. The greater part of the beer brewed in England was that designated as strong, viz. 6,570,310 bbls.—if, therefore, we estimate the proportion of alcohol in the whole 9½ millions of barrels at 5 per cent. as was done in the calculations of French beer, we shall probably be near the mark. The quantity of cider has been estimated at 4,725,000 gallons. That of ardent spirits, (we still speak of 1830,) was 27,708,331 imperial gallons; and of wine, 6,434,445 gallons, of which 2,889,608 gallons were Portuguese, or we may say Port wine, and 2,081,423 gallons of Spanish or chiefly Sherry, Catalonia and Malaga. The quantity of Madeira was but 217,000 gallons.

The proportion of alcohol in Port wine is, according to Mr. Brande, within a small fraction of 23 per cent.; in Lisbon, 18; in Madeira, 23 per cent.; Sherry, Teneriffe, and Vidonia, rising 19. As the quantity of French wines was a little over 400,000 gallons, and of German 60,000 gallons, the former of which will average about 13 per cent., the latter about the same, or 13, I can hardly be accused of overrating the alcoholic per centage if I make it 20 for all the foreign wines imported into

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Great Britain. The proportion for spirits I estimate at 50 per cent. The account will then stand as follows:—

	Gallons.			Gallons of Alcohol.
Beer,	322,000,000	at 5	per cent.	16,100,000
Cider,	4,725,000	7	do.	330,750
Wine,	6,434,445	20	do.	1,286,889
Spirits,	27,708,831	50	do.	13,854,415
	360,868,276	at a mean of 8.7 per cent.		31,572,054

The population of Great Britain and Ireland, or of the United Kingdom, was in 1830, about 24 millions and a half, so that the consumption of alcohol distributed through different drinks, would be at the rate of 1.28 gallons per individual. But if, as in the case of the estimates of French alcoholic produce and consumption, we allow for use in the arts a certain quantity, and fix this as equal to the surplus fraction over 1.25 or $\frac{3}{100}$, it will leave the consumption in the United Kingdom equal to one and a quarter gallons per individual. I have not the means of ascertaining, nor do I know that there is any authentic record of the quantity of alcohol consumed in the demands of the arts and for scientific purposes in France and Great Britain. The reader can, however, readily make the necessary allowances under this head, if he should have at any time the positive data before him. The proportion of alcoholic consumption of drinks in France was, in 1830, to that in Great Britain and Ireland, as just two to one, person for person. How different this result of figures, which it is believed represent here the facts, from the prevalent notions on the relative temperance of the two countries.

I have not the data before me, to ascertain the diminution in the quantity of alcoholic liquors, made and drunk in the United Kingdom since 1830, but we may

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readily believe that it has been, at any rate in Ireland, considerable. Opposed to this opinion, however, is that of Mr. Farr, who says that the consumption of intoxicating liquors has increased faster than the population in the last twenty years. Of France we cannot express the same favourable opinion, as the writings of Villermé and others, deploring the extended evils of drunkenness, record the state of things subsequent to 1830.

The two kinds of intoxicating drinks most largely manufactured and drunk in Great Britain are beer and spirits. In Ireland, spirits constitute the chief intoxicating beverage; the quantity of beer being small. Drunkenness, with all its precursors, concomitants and effects, is most largely induced by ardent spirits. Records, of every description, show what a curse these liquors are to the country. The subject was brought before public attention in a more authentic and authoritative shape, in a Parliamentary Report, in 1834, by a "Committee of Inquiry into Drunkenness," the chairman of which was the well-known writer and traveller, Mr. James Silk Buckingham. Under the head of the *Consequences to Individual Character*, the committee report, "Destruction of health and disease in every shape; premature decrepitude in the old; stunted growth and general decay and debility in the young; loss of life by paroxysms, apoplexies, drownings, burnings, and accidents of various kinds; *delirium tremens*, one of the most awful afflictions of humanity; paralysis, idiotcy, madness, and violent death, as proved by numerous medical witnesses, who have made this the subject of their long and careful investigation.

"7. Destruction of mental capacity and vigour, and extinction of aptitude for learning, as well as of indis-

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position for practising any useful art or industrious occupation.

"8. Irritation of all the worst passions of the heart: hatred, anger, revenge, with a brutalization of disposition that breaks asunder and destroys the most endearing bonds of nature and society.

"9. Extinction of all moral and religious principle; disregard of truth, indifference to education, violation of chastity, insensibility to shame, and indescribable degradation; as proved by clergymen, magistrates, overseers, teachers and others, examined by your committee on all these points." (*Report,—Printed by order of the House of Commons,*—p. 4.)

This melancholy picture, in all its distorted features and darkest shading, is, unhappily, the precise representation of daily disasters from a similar cause in the United States. Happily, from year to year, especially since 1830, its repulsive points are becoming softened; and we may hope that in the course of another generation an entirely different representation will be exhibited of the dietetic morals of our land.

I believe that it was Mr. Buckingham's wish, to extend the "Parliamentary Inquiry" into the effects of malt liquors; but as the whole subject was in a measure new to the members, and they feared either to shock popular prejudices, or to exhibit a state of things which might lead to a diminution of his Majesty's excise, Mr. B. was overruled. If the inquiry had been extended, in the manner suggested, it would have brought to light, or rather put on more formal record, a series of evils to individuals and the community, resulting from the general use of malt liquors, analogous to, and in many cases rivalling, those which follow in the train of ardent spirits. Others may be less annoyed by

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the drunkenness without clamour of the beer-bibber, but he himself suffers deeply, becomes heavy, stupid, and sullen, and approaches, in body and mind, more nearly to the swine, than does the gin and whiskey drinker, who, if he feels flattered by the comparison, may be said to exhibit more resemblance to the tiger or the mad dog. The active and observing, may we not say practical, friends of temperance in Great Britain, are so fully persuaded of the pernicious effects of the use—so soon running into the abuse—of malt liquors, that they practise, and recommend to others, entire abstinence from this class, as from all other kinds of intoxicating drinks. The testimony is abundant and varied in favour of this total-abstinence practice.*

The statistics of the manufacture and consumption of alcoholic drinks are too defective in the United States to admit of my giving a statement of the subject, in figures, analogous to that furnished for France, and the one for Great Britain and Ireland. Of the quantity of cider and of beer made, I have no returns, official or otherwise. A few years ago, there was a great deal of cider made in the apple regions, and of brandy distilled from it and the apples, fermented with water. That there is improvement in this last particular, we may properly infer from the returns of the amount of the products of the orchard, in Vermont for example, which, in 1840, were 1,109,387 dollars, compared with the number of distilleries, three, and the quantity distilled, 3,500 gallons.

If we fix our attention on the two kinds of intoxicating liquor which contain the most alcohol, viz. spirits

* See, among other documents, the *Third Report of the New British and Foreign Temperance Society*, 1839.

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and wine, consumed in the United States in 1830, we are startled at the terrific quantity of the first of these liquors, viz. spirits, which, by different writers at the time, was estimated to be seventy-two millions of gallons. The population was then not quite thirteen millions; which would give for each individual five and a half gallons,—or of pure alcohol, two gallons and three-quarters, without taking into the account wine, beer or cider. If we deduct from our entire population one-third, as being under twelve years of age,* and either not consuming, or using it in relatively small quantities, and deduct from the remainder, one-half, as belonging to the female sex, and also non-consumers,—but this is merely conventional politeness as regards a great many of them,—and there remain about 4,350,000 who were the regular drinkers, and whose allowance of spirits, per man, must therefore have been more than 16⅔ (16.6) gallons, or of alcohol, eight and a quarter gallons.

The wine of all kinds, consumed in the United States in 1830, may be estimated at about three millions of gallons, or not a quart for each person, annually. As the proportion of French wines is greater than in the English importations, we may rate the per centage of alcohol at eighteen, on an average for the whole. This will give, of alcohol, five hundred and forty thousand gallons,—and add something to the fearful amount of ardent spirits.

But, while thus picturing the state of things in 1830, and the 'bad eminence' to which our country had

* The estimate of the proportion in this case, as well as of the two sexes, is not meant to be rigidly accurate, indeed the first is merely approximative.

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reached in the consumption of alcoholic liquors, it is but right, before dismissing the subject, to know, that a happy change is coming over us in this particular at least. The entire product of the distilleries in the United States, in 1840, as given in the American Almanac for the present year, was 36,343,236 gallons. The imports over the exports of spirits may be estimated at 2,500,000 gallons; and of wine, at 4,000,000 gallons, —leaving, at the rates already given, rather more than a gallon and a quarter of pure alcohol per individual, for a population of seventeen millions of persons, or, a proportionately reduced consumption of more than one half the quantity of intoxicating drinks, chiefly of ardent spirits, in a period of ten years. The reduction in the quantity of cider consumed, has fully kept pace with that of the stronger liquor. I will not affirm the same of beer, though, on this point, I have not the requisite data at hand. To sum up for 1840, the statement will stand thus:

	Gallons.		Gallons of Alcohol.
Home spirits,	36,343,236	at 50 per cent.	18,171,618
Foreign spirits,	2,500,000	" "	1,250,000
Wines,	4,000,000	18	720,000
Beer,			
Cider,			
	42,843,236		20,141,618

If we suppose the real consumers to be equal to about 5,700,000 persons, or a third of the entire population, there would have been for each person six and four-fifth gallons of spirits of all kinds, and two and four-fifth quarts of wine, together, equal to three and a half gallons of pure alcohol, being a reduction from the consumption of 1830, or in a period of ten years, of more than 57 per cent.

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CHAPTER XV.

LONGEVITY.

Desire for longevity natural and proper—Influence of the aged—Worth and genius more influential with length of years—Causes of longevity—Inherited predisposition—A good physical education—Great bodily strength not necessary—Average intellectual and moral energy—Strong passions a draw-back—Regularity and temperance—Early rising—Simplicity of diet—Inherited weakness increased or abated by the mode of life—Climate—Specific inquiries—The influence of sex—Females attain greater longevity than males—Fluctuations, in different ages, in the two sexes.—*Age*—Increased mortality in early life—Maximum of vitality—when reached—Modifications by climate—When suicide is most frequent. *Race*—Greater mortality in the black race. *Climate* and *Locality*—Hot climates not preventive or curative in consumption—Acclimation—Residence for two or three years does not diminish mortality in hot climates—Difference in mortality between town and country. *Seasons* and *Temperature*—Cold adverse to vitality, particularly in the young and the old—Extreme heat in cities destructive of infant life—Suicide, when most frequent—*Occupations* modifying vitality—Intemperance the chief morbid agent—Pictures of in France and England—Military life adverse to longevity—Vaccination—Insanity—Mortality in different nations.

> "Age sits with decent grace upon his visage,
> And worthily becomes his silver locks;
> He wears the marks of many years well spent,
> Of virtue, truth well tried, and wise experience."

MEN, when not insensate by evil passion and evil habits, with whatever cares they may be opprest, and

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in every variety of situation and circumstance, naturally look forward to the probability of their entering into the vale of years, with matured experience and chastened feelings. Longevity is not only desired, but desirable, if sought after in the true spirit of medical philosophy, and of religious morality. The virtues of old age seem to exhibit human nature at its culmination; they at once carry with them the most eloquent precept and impressive example. Never does the triumph of moral over brute force appear more conspicuously, than in the persuasive voice of old age, arresting the hand of violence, turning away from his career of conquest and of rapine, the ruthless warrior, or calming the wild passions of an infuriated crowd, wrought up to attempt an indiscriminate destruction of life and property. Alexander of Macedon, when he approached Jerusalem, in all the exaltation of victory over Darius, and fully intending to give the city up to plunder, could not refrain from prostrating himself before the Jewish high priest, and thus worshipping the Deity in the venerable person of his aged minister. Attila, that terrible scourge of the human race, was, for once, stayed in his bloody march to Rome, by the aged St. Leon, whose impressive warning had more power over the barbarian king, than armed legions. On a lengthened span of years would seem to depend not only the completion of their possessor's own fame, but the glory, perhaps safety, of his country, and the establishment of a grand principle involving the happiness of future millions. Men, towards the close of a long life, would seem, in giving their experience, to be almost able to convert history into prophecy. The Roman senate, wavering on the manner they should receive the propositions of Pyrrhus, for peace and divided rule in Italy, were only called back to a sense of

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their own dignity, and to the proud determination never to accept terms from an enemy, by the zealous counsel of Appius Claudius, who, though old, infirm, and blind, was roused by the emergency, and had himself carried to the senate house, where he spake as an oracle, in predicting Rome's future greatness. And, in fact, by their subsequent resistance and final success over Pyrrhus, the Romans acquired a loftiness of sentiment, and enlargement of power, with the reputation of being invincible, which soon after gained them all Italy and Sicily, and finally the dominion of the world. Dandolo, "blind old Dandolo," was eighty-four years of age when he was made Doge of Venice; and yet the remaining ten years of his life were among the most eventful in the history of the republic, into whose counsels he infused a vigour and determination which would have been in vain attempted by a young man. Converting the arms of the crusaders to the benefit of his country, he eventually led them on to the storming of Constantinople, and was the first to plant the standard of St. Mark on the walls of that city. Finally, to the ducal was added, by his companions in arms, the imperial crown, which he resigned for the less imposing, but more substantial honour of Duke of Romania.

Who, at the time, did not see in the prolonged life of the consistent La Fayette, the history of liberty for the preceding fifty years; and who did not feel that the triumph of liberty was more complete when he, the representative of its suffering during the times of anarchy and of military conquest, was, by national acclaim, hailed as its patriarch, and the depositary of its charter. La Fayette, unable to save the monarchy and constitutional liberty in the first revolution, led, subsequently, a life of virtuous retirement, and matured his

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energies for that struggle, when, in the evening of his days, his services were again called for, with such honour to himself and benefit to his country. Contrast him with that great bad man, his compatriot Mirabeau. The latter had a mind of the highest order, and eloquence the most commanding and impressive; but his commentary on national liberty, was personal licentiousness; and hence, his promise to save his country from anarchy, and king from the scaffold, was rendered vain by a premature death—the direct effect of the grossest licentiousness, and neglect of those laws of hygiene, on which longevity so much depends. Had such men as Fox and Sheridan attached more importance than they did to the means of attaining longevity, they would have been more attentive to those maxims of temperance and worldly prudence, by which the sphere of a man's exertions in the cause of humanity and patriotism are so much enlarged; and they would have retained the ability, in a healthy advanced age, of being their country's pilots amid the storm, as they had been its forward watch to announce danger. The principles of the whig opposition would not then have suffered so signally as they did, by Fox, its great leader, receiving a stipend from his political partisans and friends, in the shape of a subscription; an acknowledgement, in fact, of his necessities, which, together with disease, were the results of his intemperate extravagance. Poor Sheridan, with all his oratory and wit, became an outcast from society—a drunken, fallen and degraded man.

Why, in the instances of Savage, Burns, and Byron, were genius and fine feeling clouded, and made at times to appear as a curse to their possessors, and a calamity to their fellow mortals? Why should the delight which we experience before the majesty of in-

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tellect, clothed in the harmony of song, be marred in their persons? Why, but because they proudly neglected, aye, scorned, the plain precepts of temperance, and had no ambition to enter into the vale of years. Had they consented to look forward to such a termination, they would, while retaining, have augmented their energies, sublimated still further their ideas, and have passed their earthly bourne with the pure, yet brilliant light of the setting sun, and not sunk like a meteor, filling the people's mind with awe and doubt. Morality would then have had less cause to disclaim the alliance of genius; nor would small minds be so ready to believe in the base maxim, that stormy passions are the necessary accompaniments of lofty intellect.

Causes of Longevity.—How is longevity to be attained?—The conditions are of a somewhat diversified nature. A first and important requisite is, to be born of long-lived parents; for in this, as in almost every other corporeal predisposition or peculiarity, much is inherited. We sometimes meet with whole families, in which longevity would seem to be a privilege, as in that of Parr, who lived 152 years—his father and his own children and grand-children, attained to a great age. This tenacity, if we may so express it, of life, enables an individual to resist many of the causes of disease and decay, which others, less fortunately gifted, would sink under. However unable we may be to explain the fact, or assign the peculiar conformation or temperament evincive of this long-lived tendency, it is hardly more surprising than that innate vigour of intellect and power of genius, which rise superior to the operation of most of the causes which would debase and brutify ordinary minds. Some will be ready to exclaim, that as longevity is a gift inherited from birth, it matters not to make any further

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inquiries; the chief condition being one beyond our control. But it is with this, as with all the other gifts of mind, person, or fortune, which we inherit from our progenitors—we may squander away the richest store, and render it profitless; or by care in husbanding a small stock, render it available for a long series of years. Health and strength will be readily lost by vice and idleness—while a tendency to hereditary disease, as of gout, insanity, or consumption, will be overcome by temperance, in its extended sense.

A good physical education is an important requisite for longevity. There is a greater chance of this being obtained by persons resident in the country, and early inured to a life of activity and toil: with many, the exposure is excessive, and premature debility and death are the consequences; but they who survive this severe training, have acquired augmented powers of resistance to the ordinary causes of bodily decay. This gives me an opportunity of remarking, that no class of persons are so uniformly obedient to some of the most important hygienic rules, as they who are commonly said to laugh at all rules—we mean labourers in the field, peasants and farmers. They are remarkable for their regularity in the hours of labour and repose, as well as of eating; they soon suffer from any notable deviation in this respect.

Great corporeal strength, whether acquired in labour, or in the training for athletic and pugilistic sports, is not favourable to longevity. The muscles attain to an unnatural growth, and the organs of nutrition, too highly stimulated by much substantial aliment, are easily thrown into fatal inflammation. Hippocrates made this remark of the athletæ of Greece, and it is equally applicable to the pugilists, porters, and coal-heavers of

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Great Britain. Hence the circumstances under which the human body can attain to its maximum of growth and of dynamic power, are not those the most favourable to longevity. Few, who have arrived at a great age, were ever remarkable for Herculean frame or great bodily prowess.

I do not at this time remember an example of a fool, or of an idiot, ever having attained to a very advanced age. Old persons, by a wearing out of their faculties, occasionally become fatuitous; but this is a consecutive, not primary state. Some activity of the functions of the brain and nerves—that is to say, of the mind and senses, is essential to that freedom of muscular motion and healthy circulation of the blood, on which length of life so much depends. It is for want of the nervous excitement, called into play by the attainments of early life and constant collision in civilized society, that the savage is seldom long lived. So soon as his limbs fail him in the chase, he has no longer any occupation or amusement; his faculties become torpid, and his fluids stagnate.

Change of scene, travel, and diversified adventures, have often marked the life of those who have reached a great age. They who have followed agricultural pursuits, appear conspicuously on this list. The inference is, that living much in the open air, and regular daily exercise, are favourable to longevity. The rich, as well as the poor, have found their full account in acting up to this principle; among the former by far the greater number of long livers have been distinguished for their free exercise in the open air, either in the sports of the field or in travel. This is more particularly true of the period of their youth, on the manner of passing

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which, greatly depends the complexion of future life and bodily health.

Devotion to study and scientific pursuits, is by no means unfavourable to longevity, if those so addicted do not indulge too much the caprices of appetite, and deprive themselves of fresh air and exercise, and a due period for sleep. The annals of literature and science abound in examples of long livers.

But men can rarely flatter themselves with reaching this lengthened term, who are a prey to such contending passions as ambition, jealousy, envy, hate, and, in fact, unrestrained emotions of any class. Hence we find that contentment and serenity of mind, a well regulated moral sense, and trust in Providence, are powerful aids to our attaining longevity. This has been, with few exceptions, the frame of mind of all those whose lives have been protracted beyond the usual span. A fact like this requires no commentary.

It is impossible to abide by this last condition without leading a life of some regularity, and marked temperance. A man may be at one time at sea, at another on shore, sometimes in camp, and again enjoying rural quiet; and yet he is not necessarily deprived of the privilege of dividing his time agreeably to some method —taking his repast at regular hours, and sleep at stated intervals.

There is hardly any one point on which there is such entire accordance in practice among long livers, as in early rising, which implies, also, retiring to bed at a stated early hour in the evening. Deprivation of sleep is peculiarly exhausting; no effort at renovation, by any other means, can supply its place. Feebleness of body, premature old age, and insanity, are some of the effects of protracted vigilance. Too much, or too little exer-

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cise of the functions of the animal economy, is nearly equally unfavourable to the enjoyment of sleep. The former produces pain of the joints and limbs, and fever, as in soldiers after forced marches, or labourers overworked; the latter does not adequately exhaust the accumulated excitability of the locomotive and sensitive apparatus, and hence wakefulness, restlessness, and what is commonly called nervousness. Similar extremes in the exercise of the internal nutritive organs are to be deprecated for the same reason,—the rest of inanition, or of protracted abstinence, is as contrary to nature as inordinate stimulation by excessive repletion and intoxicating drinks. Sleep flies, in the first state, and is heavy and apoplectic, or disturbed by frightful dreams in the second.

The food of those most remarkable for their longevity, has been plain, and even coarse. Simplicity of diet is all-important. A man's health will suffer, by using promiscuously, various articles of food, any one or two of which, alone, would sustain him in all the plenitude of bodily vigour, for a long lifetime. On this point, the annals of both the rich and the poor, who have been candidates for longevity, exhibit considerable uniformity of dietetic practice. And here we may take occasion to observe, that, as every exertion exhausts vigour, and every protracted excitement is followed by lassitude, we but enfeeble our bodies, and render them more readily operated on by the causes tending to their destruction, when we force our organs, digestive, circulatory, and respiratory, and the ones in subservience to them of absorption, secretion, nutrition, and the evolution of animal heat, into a state of action beyond what is called for by the wants of nutrition. Gout, apoplexy, excessive obesity, and oppression of the functions. which are the

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product of free living, especially great eating; and inflammations of the brain, heart, lungs, liver, stomach and kidneys, and fatal fevers, one or more of which may be brought on by the use of strong drinks, are proofs and admonitions to which no reasoning man can be insensible.

It will be alleged, that there are instances of drinkers of ardent spirits and vinous liquors, even some gourmands, who have been long livers. The fact may be so; but it would be most unphilosophical to draw an inference in favour of such bad habits. It has pleased the Creator to endow us with powers of endurance and resistance, amid the exposures to which we are led either in the performance of duty or the gratification of appetite. But there are limits to these powers, varying, it is true, with the individual, although still ascertainable with tolerable accuracy.

Persons much in the open air, such as labourers and pedestrians, who have their due quantum of sleep, and use simple aliment, evince little sensibility, and can, on this account, take a daily dose, or more, of ardent spirit, without, as the popular phrase is, their feeling it; that is, without its intoxicating, or throwing them into a fever, as it would the secluded mechanic, leaning over his work, and irritable citizen, confined all day to his desk or counter. Distinct from their occupations and early physical education, there is also a notable difference in the excitability of individuals from birth—some tolerating, without complaint, atmospherical extremes of temperature, and internal stimulation, which, to others, would prove painfully perturbating.

But however various the temperaments of men, and unexpected their idiosyncrasies, there is hardly an individual, who has not a predisposition to be readily af-

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fected by morbid and inflammatory action of one organ, in preference to the others: and we may add, that an unavoidable effect of all stimulants, not directly alimentary, as well as of excessive alimentation itself, is to increase this predisposition, or tendency to the disease, and even actually to bring it on. On the other hand, it is a matter of familiar experience, that such tendencies have been rendered perfectly harmless by strict temperance, verging on abstemiousness. In fine, the question may be reduced to these two maxims:—first, that by dietetic rules, and those rules consisting mainly in the use of a few plain articles of food, and simple water for drink, men tottering on the borders of the grave, have prolonged their lives for a series of years, in the enjoyment of good health and cheerfulness, usefully to society, and honourably to themselves:—second, that the exhaustion and infirmities of lingering disease, the habits of a valetudinarian, have never been completely removed, or more than barely palliated by a course of what is called generous living, and a liberal allowance of strong drinks. Temperance has not only a preservative, but a recuperative operation. It prevents many diseases, and is the indispensable auxiliary to any remedy, or series of remedies, for the cure of diseases actually present. It is even superior, on many occasions, in its curative powers, to all other remedies, however skilfully combined by the arts of pharmacy and medicine. By the use, on the other hand, of strong drinks, and highly seasoned food, or of either singly, there is imminent danger—a perpetual invitation to evils, which would otherwise never have made their approach. Original phlegm of constitution, and the force of habit, occasionally render men able to indulge, without apparent suffering, in the use of strong drinks; especially if the countervailing agencies of simple diet, much exercise in the open air, and regular sleep, be

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in operation at the time. But, were an argument in favour of these drinks to be urged on such a foundation, we might, with equal plausibility and logic, insist on the salutary effects of the free and general use of various liquid preparations of opium, hemlock, and henbane. These substances are at times sanative: but much and frequently used, they are known to wear out the energies of life, and to abbreviate its course. In fine, the weak may become strong, the sickly enjoy health, the imminence of death give way to the enjoyments of a long life, by the substitution of simple aqueous drinks for vinous and distilled liquors; and he who seemed to be dying at forty, has, by the reform, been hale and hearty at eighty.

Climate has a notable effect on longevity. To say nothing of those regions of the world proverbially sickly, it is known, that the extremes of great and prolonged cold, near the poles, and of heat, in the equatorial regions, are adverse to long life. The first prevents the due development of the animal frame, and enfeebles its functions; the second excites and wastes the powers of life, and brings on premature old age and decay. We have more examples of longevity, however, in cold and temperate climates, than in hot ones. Russia, Norway, Denmark, and Great Britain, furnish the greatest number of individuals who have attained to a very great age. But, even in southern climates, temperance and abstemiousness, by countervailing, in a measure, the excitement and exhaustion produced by heat, have given their votaries long life. Of these facts, we have unequivocal proof, in the history of the Christian recluses of Asia and Africa, in the early ages of the church.

After these preliminary reflections on the subject of longevity in general, which are nearly a repetition of those I offered in the *Journal of Health*, Vol. II., some years ago, we ought, when we inquire into its causes

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and modifying circumstance in detail, to do so under the head, first, of those inherent in and peculiar to the individual; second, of those external and occasional or adventitious. Under the first will come sex, age and race, to which some may add temperament. Under the second are enumerated climate, season, locality, occupation and mode of life in general. My remarks on each of these will be brief.

I. Sex. If it be a question to be determined, which of the two sexes has the greatest prospect of longevity, then, as part of the general subject, it will be asked, which of the two is the most numerous at the beginning of life. The reply is, that there are more boys born than girls, in the proportion of sixteen of the former to fifteen of the latter. The main question of greater longevity is determined in favour of the female sex. The original difference in favour of the males, on the score of numbers, and consequently chances of longevity, is done away with by greater mortality in early life, and also later in life, on account of intemperance, excessive fatigue, multifarious exposures and wars. Even a cause of death peculiar to females, that of child-birth, is not so operative as from violent deaths among men. In England, in 1838, 2811 women died in child-birth, while 8359 males and only 3368 females died violent deaths. The mortality attributed to intemperance was of 125 males and 36 females.

But there are primary causes inherent in the organization of the male, which are active, even before birth, in his destruction. Thus, it has been found that the proportion of still-born males is greater than that of still-born females. On an average of twenty births, there is one child still-born. In illegitimate children, the proportion is two in twenty-four. In West Flanders,

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according to M. Quetelet, the proportion of still-born males to still-born females, was as fourteen to ten: it was the same in Berlin.* Still illustrative of the fact of differences of original organization and consequent impressibility in the males by agents to which both sexes are equally exposed, is the fact mentioned by Dr. Emerson, in reference to mortality in early life in Philadelphia. "It is," he tells us, "a fact of the highest interest, that although the males at birth, for the whole period (of ten years), exceed the females by more than seven per cent., such is the greater ratio of mortality among them during the first year of life, that at the fifth year the excess of males is only about five per cent., whilst by the tenth year, it has been so reduced that the excess is about one per cent."†

The proportionate difference of mortality between the two sexes is variously estimated by different writers. The following table exhibits the deaths annually of each sex, out of 1000 of each living in each interval of age in England.

Between Ages.	Males.	Females.
0 to 5	53.5	46.0
20 " 30	10.1	10.4
30 " 40	11.4	12.4
40 " 50	14.9	14.9
60 " 70	45.3	41.2

It will be seen from this table, that while the mortality of the males greatly exceeds the females in the first five years of life, there is nearly an equality established between the two sexes in the period between

* British and Foreign Medical Review, Vol. 3, p. 47.

† Medical Statistics, consisting of estimates relating to the population of Philadelphia.—*Amer. Jour. Med. Sciences.* Nov. 1831.

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twenty and thirty years of age, which is lost to the disadvantage of the females in the next ten years, or between thirty and forty, and established again in next decade, or between forty and fifty. The advantage is again on the side of the females, between sixty and seventy years of age. The Swedish tables, in which the sexes are distinguished, make the mortality of males greater than that of females all through life; and this accords with several other observations. In the eighteen years, 1813–30, the mortality, according to English returns, was greater among males than females, up to puberty and after fifty; during the period of child-bearing more females died than males. The observations made in Belgium present nearly similar results.*

There is one disease from which the mortality, at least in England, is greater among women than among men, and that is consumption. The causes of this difference are thus set forth by Mr. Farr:—"The higher mortality of English women by consumption may be ascribed partly to the in-door life which they lead, and partly to the compression, preventing the expansion of the chest, by costume. In both ways they are deprived of free draughts of vital air, and the altered blood deposits tuberculous matter with a fatal, unnatural facility. *Thirty-one thousand and ninety* English women died in one year of this incurable malady." Both of the causes of death among English women here specified by Mr. Farr act with additional and alarming power on American women, who go out much less than the English, and with whom the absurdity of fashion has more despotic sway among all classes, rich and poor, mistress and maid, white and black. The following

* British and Foreign Medical Review, *ut supra.*

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exhortation of Mr. Farr ought therefore to command as much attention on this side of the Atlantic as he wished it to have among his own countrywomen. "Will not this impressive fact induce persons of rank and influence to set their countrymen right in the article of dress, and lead them to abandon a practice which disfigures the body, strangles the chest, produces nervous or other disorders, and has an unquestionable tendency to implant an incurable hectic malady in the frame? Girls have no more need of artificial bones and bandages than boys."

But, if females are greater sufferers from phthisis, and indeed from diseases of the organs of respiration in general, they are less liable to the fatal fevers of warm climates. In the West Indies, in civil life, a woman is esteemed twice as good a liver as a man—arising probably from her temperate habits and different degrees of exposure to the night air. In barracks, the same difference of liability is observed between the sexes; "but during the war," says Dr. John Hunter, "when the wives of the common soldiers were exposed with their husbands, they suffered in the same proportion." We believe that this remark is applicable to the wives of those soldiers of the Cross, the devoted missionaries in Asia and Africa. The following table is the nearest approximation to the relative liability of women in civil life, which we possess; it indicates the proportions which occurred in the epidemic at Gibraltar, in 1828, among the inhabitants:*

Men, - - - - -	684
Women, - - - - -	286
Children, - - - - -	200

* Dr. R. Williams—Elements of Medicine, vol. ii. p. 456.

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It has been observed on the continent of Europe that the mortality among women in the country during the child-bearing period is often greater than in the towns. This is attributed by some to the severity of the out-door and other labours to which they are subjected, at the very time when their health requires great care. In Geneva, M. Marc d'Espine tells us that the mortality is less in the city and greater in the country among women than among men.* M. Mallet, in his elaborate statistical inquiries into the population of Geneva,† says that at the age of twenty-one years, the equilibrium between the two sexes on the score of mortality is re-established; but the probability of life at this time is greater for the female than in the male, in being as 37.81 to 35.91. At fifty years of age there remains of 100 born of each sex, 22.0675 men, and 23.1776 women; numbers which are in relation of 35.91 and 37.71; that is to say, almost identical with the figures representing the mean duration of life of the two sexes at the date or point of their equality. M. Quetelet introduces, in his work *On Man and the Development of his Faculties*, an elaborate table of the proportion of the deaths of either sex from the age of one month to that of 104 years. From this the following results may be deduced:—At birth the probable life is 25 years; in other words, at the age of 25 only one-half of the children born at the same time will be alive. The probable life of the female is greater than that of the male; the former being 27 in the country, and more than 28 in towns; the latter less than 24 in the country, and less than 21 in towns.

* Ann. d'Hyg. &c. t. xxiii, p. 14.
† Ann. d'Hyg. &c. t. xvii.

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In both sexes, and in all situations, the probable life is, according to M. Quetelet's observations, (made on the population of Belgium,) longest about the age of five; being 51 for women in towns and men in the country, and 48 for women in the country and men in towns. The farther we advance from this period, the shorter the probable life becomes. Thus, at the age of forty, it is 27 for men in the country and women in towns, and 25 for women in the country and men in towns. At sixty, it is from 12 to 13, and at eighty, only 4.

The mean life in Belgium is 32.15 years. Considering sex and place of abode, it is as follows:—

	Towns.	Country.
Men,	29.24	31.97
Women,	33.28	32.95

AGE.—The deaths in the first month after birth are, from the various exposures of early life, higher than would be indicated by the rate of infancy. There are particular periods when the strain, as it were, upon life, is greater than at others, and this not measured always by advancing chronological series. After the first year, the ratio of mortality rapidly declines, and this decrease is shown by the enumeration of deaths for each of the four following years. The maximum of the probability of life at Geneva for the last quarter of a century was at 2 years from birth, and that of mean life or mean duration at 3 years. M. Mallet, who makes this remark, infers that the nearer the maximum of vitality approaches to an age proximate to birth, the more certain is the life of infancy. In France and Belgium, and we may add in England, the maximum vitality is at five years of age; that is to say, we have more security that a child who has attained its fifth year will live out an average

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existence, than we had when this same child was one year, or even two, or three or four years old.

"In examining the vitality at different ages, a very extensive range in the scale of intensity is perceived: man is never equally mortal during two summers of his life; and as his being revolves through its course in minutes, years, or equal intervals, the vitality at first increases, and then decreases in geometrical progression; but, as experience has shown, the rate of progression changes. There are three orders of progression. The first extends from birth to the second teething, when the body becomes every year less liable to death; the second prevails from puberty over manhood, when the force of mortality slowly creeps on, and grows stronger; the third sets in on the eve of old age, and with a more rapidly accumulating energy.

Dr. Price pointed out these remarkable periods; but to Mr. Edmonds the honour is due of expressing their rates of diminishing or increasing mortality in the subjoined numbers.

Numerical Values, which indicate the rate of Increase or Decrease of the Force of Mortality, in a given time, assumed to be one year.

Constants.		Period over which Constant presides.
.676	-	Infancy (from birth to eight years of age).
1.030	-	Manhood (from twelve to fifty-five years of age).
1.080	-	Old age (from fifty-five to end of life).

"By means of the three constants it is easy, when the mortality of one year is known, to deduce from it that of the next; for example, if the mean mortality at the age of twenty-five be one per cent., the mortality in the next year (twenty-six) will be nearly 1.03, which

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multiplied by the constant of the period, gives the mortality for the twenty-seventh year, &c. up to fifty or sixty; where the second merges into the third period whose constant must then be employed. As the rate of mortality is ordinarily obtained for equal periods of ten years, it may be well to bear in mind that the mortality at the ages between twenty and fifty, increases one-third every ten years: in old age it should nearly double.

"Man owes nature a debt, for which he pays compound interest, the constants show how the rate of interest varies.

"Infancy, manhood and old age, are then essentially distinct periods of human life, and must not be confounded with the arbitrary and subordinate, but useful divisions of some physiologists. The ages of growth, generation and decay, have, in fact, from the time of Aristotle, attracted the attention which their paramount importance demands; nor in pathology is any other division of life so useful at the present day, either to guide the practitioner in the investigation of disease or in prognosis; yet practical writers appear no more aware than the ancients, that the number of deaths at each period of life, happens according to a predestined order."*

M. Villermé, in a paper in the *Annales*, so often quoted, (*Tome IX*,) on Epidemics, in their relations to *Public Hygiene*, *Medical Statistics* and *Political Economy*, points out the great probability of the mortality from epidemic diseases, obeying the same general law of mortality according to age. Out of the same number of the sick, in very young and in old persons,

* British and Foreign Medical Review, *loc. cit.*

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the mortality is greater in the former, the nearer they approach to birth, and in the latter, the more advanced they are in years.

Thus for example, M. E. E. Duvillard, in a calculation on the mortality in small-pox, before the discovery of vaccination, found that there dies among nearly all the victims to this disease, when it prevails epidemically, one person in every

3.0	who are	1	year old.
3.6	"	2	"
5.3	"	3	"
8.1	"	4	"
12.2	"	5	"
17.6	"	6	"

Finally, at ten years of age, there only died one in thirty-four; and this is the epoch in life in which, when a person is seized with small-pox, there is less probability of his dying, just as it is that of the absolute minimum mortality.*

Age is a modifying cause in the predisposition to diseases of particular professions and climatic exposures. In the English Foot and Dragoon Guards, at home, the mortality between the ages of 18 and 33, is great, and is chiefly referred to consumption. In warm and sickly climates, the mortality among soldiers increases with their age, at a fearful rate. Major Tulloch, in speaking of this occurrence in the soldiers at the Mauritius, attributes the result to intemperance. But, as remarked by Dr. Williams, (*Op. cit.*) the experience of the army in the West Indies, and at every station, tropical or temperate, from which reports have been obtained, show

* Ann. d'Hyg. &c. t. IX, p. 31–2.

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that the exposure being equal, the mortality from paludal fevers, is increased in a direct ratio to age, so that the superiority of veteran soldiers over young recruits, in the endurance of fatigue, and those numberless hardships to which they are exposed in actual service, is counteracted by their increased susceptibility to the action of this [alleged] poison.

As regards the age when self-destruction is most frequent, we learn that in England, at least, this is between 50 and 60 years, in which period twenty per 100,000 commit suicide; and between 60 and 70 years, the number per 100,000 is 19.8, very nearly twenty. The tendency to self-murder is greater in the metropolis, (London), and least in Wales and the conterminous counties.

Race.—The most obvious differences distinguishing races, are those between the white and the black, and circumstances, some of them to be deplored, have placed many data in our power, to enable us to institute comparisons of their respective vitality and chances of longevity. That the individuals and communities of the black or Negro race, whose progenitors have ever inhabited central and tropical Africa, should suffer in health and life by transplanting to northern climates, does not excite our surprise; but how account for the fact stated, on statistical basis, that the warm climates so nearly approaching to that of Africa, as the Mauritius and the West Indies, seem alike unsuited to the constitution of the negro? So fast is the negro race disappearing in the Mauritius, that in five years the deaths have exceeded the births by upwards of 6000, in a population of 60,000. In the West Indies, generally, Major Tulloch assures us, that there are causes continually in operation affecting the vitality of the negro

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population, which must ultimately end in its extinction. To diseases of the lungs, the negroes are particularly prone. Even in his native country the negro seems to suffer as much from these diseases, as the British troops in their own country. As illustrative of the difference in predisposition to this class of affections, it is worthy of remark, that among 71,850 native troops serving in the Madras Presidency, the deaths by every description of diseases of the lungs, did not, on an average, exceed one per thousand of the strength annually.

Dr. Emerson, (*Op. citat.*) on the subject of the mortality of the black people in Philadelphia, shows a result "most appalling for the African descendants. The greatest mortality among these in any single year, was in 1820, when it amounted to one death in 16.9 inhabitants. The smallest in 1830, when the ratio was one in 27.2. The average for the whole ten years is one in 21.7, whilst that for the whites alone, during this unusually sickly period, is one in 42.3. The lowest rate of mortality for the whites occurred in 1821, and was one in 49.1 inhabitants, the highest in 1823, when it amounted to 1 in 33.8."

II. Of the extraneous or adventitious causes affecting longevity, climate is the first which was enumerated. The very annunciation of the problem is of a complex character, since climate is not a unit, nor hardly a combination of any series of known and readily appreciable agencies. There are, it is true, certain general features contrasted enough to seem to justify our founding observations on them. I shall, in order to lessen the ambiguity of the subject, treat under the same head, of the influences, both of—

Climate and Locality.—It is not easy, in fact we want the desired information, to enable us to speak of

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the comparative longevity in different climates. With the relative mortality even we are not sufficiently acquainted. One result has been decided of late years, from observations in the British troops in the Mediterranean, the accuracy of which has been strengthened by similar ones among civilians, viz: that pulmonary consumption, so far from being an unfrequent disease in warm and tropical climates, is really more frequent and more rapid in its course, than in colder climates. This remark applies to other diseases of the lungs.

The inflammatory affections of the lungs are nearly twice as prevalent in the Mediterranean as among the same number of troops in the United Kingdom; and in the mild climate of Malta, they are also twice as fatal.* It has been found, also, that a body of selected soldiers, subject to no severe duty, and exposed to no hardship, lose, annually, a larger proportion of their number in the Mediterranean, by consumption, than in the United Kingdom. This inference, however adverse to generally received opinions, is strikingly corroborated by the prevalence of consumption, and other pulmonary affections, among the civil inhabitants of Malta.

It has been ascertained, also, as the result of careful tabular returns of the diseases and deaths among the British troops in the West Indies, that at least twice as many cases of consumption originate in that climate as at home, though catarrhal diseases, to which the origin of consumption is generally ascribed, are there comparatively rare. The practical inferences to be deduced

* Statistical Reports on the Sickness, Mortality, &c. in the Troops in the United Kingdom, the Mediterranean, and British America, &c. &c. London, 1839.

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from these facts is, that, generally speaking, a tropical climate can neither prevent the development, nor arrest the progress of pulmonary consumption; and that, consequently, the practice of sending thither patients, either threatened with, or presenting actual symptoms of con sumption, is decidedly bad.

Of the loss and abbreviation of life, by fevers, in hot climates, almost every reader is aware: and the fact needs hardly to be enlarged on here. The evil is most felt, however, by strangers to the climate, such as Europeans or North Americans going to the East and West Indies. The proportionate mortality among young soldiers in the West Indies is as great as among the aged and decrepid at home. The duration of human life, even in the natives of marshy countries, or those in which remittent and intermittent fevers prevail, is much abridged, compared with that of the inhabitants of a higher country and more healthy soil. But still more is the invader affected. "The invasions of Holland, of the Burmese and of the African empires, has, in each instance, been so disastrous to the troops, that the whole force must have perished from this class of disease in a few months, but for the success of their arms in the one instance, or their being withdrawn from the pestilent atmosphere in the other." This observation, and it might be greatly extended, confirms the accuracy of the opinion advanced in the first chapter of this work, on the connection between health and morality,—and the falling back on barbarism, and its concomitant inroads on health and life by war.

It is a popular and generally received belief, that residence in a sickly climate diminishes the danger from disease, by what is called acclimation or acclimatiza-

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tion. But the result of inquiries, in the "*Statistical Report on the Sickness, Mortality, and Invaliding among Troops in the West Indies*," shows that this belief is founded on erroneous data. Thus it appears, that while the annual mortality among those resident one year was only 77, and of those resident two years 87 per 1000, the mortality of those who had been longer in Jamaica averaged 93 per 1000. In the Windward and Leeward command,—in the average of all the statements, the last years appear to have been more fatal than the first.*

As regards difference of locality, to which we must add—and herein consists the real difference—denseness of population, it is ascertained beyond doubt, that towns are most unhealthy; that large and populous cities are the graves of the human race, and could not maintain their population without the incessant supplies which are furnished by the inhabitants of the rural districts, flocking thither with the hopes of making fortunes; and that the country is the only situation in which the human race can preserve health and attain a moderate degree of longevity. If we required additional proof of the accuracy of this view, it would be found in the observations of Mr. Farr, deduced from the comparative examination of the diseases in both situations on a large and extended scale. He compares the cities, whose population is 3,553,161, with the counties, which number 3,500,750. The deaths in the first, or Urban division, were 47,953; in the second, or Rural, 29,693. This was in 1837–8.

The three following diseases, which are chiefly of adults between the ages of fifteen and sixty-five, show

* Edinburgh Med. and Surg. Journ. Vol. I. 1838, p. 457–8.

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that unhealthy places augment the fatality of diseases in different degrees:

	Counties.	Cities.	Increase per cent. in cities.
Deaths by Consumption,	5,857	8,125	39
" Child-birth,	217	372	71
" Typhus,	1564	3,456	221

A view of the deaths for the city districts and the country districts, for 1838–9, leads to similar results. The population in the two were, of the former, 3,726,221; of the latter, or country, 3,539,908; and the deaths under the first head, 101,019, and under the second, 70,410. The mean duration of life in the two kinds of locality, would differ nearly in the proportion of 37 years and 50 years.

Mr. Farr does not believe that cities are necessarily so unfavourable to human life: he thinks there are adventitious, but yet powerful causes operative, which might, with suitable care and energetic effort, be prevented. After recommending a prohibition of the burial of the dead among dwellings crowded with the living,—the exclusion of unwholesome manufactories and slaughter-houses from densely-peopled districts, and the improvement and extension of sewers, he observes on this last point: "If a survey were made of the districts of the metropolis, and the levels, the sewers, the drains, and the nuisances known to be pernicious were accurately laid down upon a map, it would agree very remarkably with the table of relative mortality; and the construction of such a map would complete the view of the evil in all its details, and form the basis of a well-planned remedy." In every city, the sewerage and drainage may be considered to be among the more

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important elements, perhaps the most important element of health and longevity.*

The mortality of cities and towns in Belgium is, to the mortality of the country population, nearly as four to three:—

	Population.	Mean number of deaths.	Deaths in 1000.
Cities and towns,	998,118	270,26	27.1
Country,	3,066,091	652,65	21.3

The mortality in all Sweden, compared with that in Stockholm, presents results equally unfavourable to residence in cities:—

		Deaths.			Deaths.
Stockholm	Males,	1 in 27	All Sweden	Males,	$1\frac{3}{4}$ in $33\frac{1}{2}$
	Females,	1 in 21		Females,	1 in 36

Mr. Edmonds has, the writer from whom I now quote (*Brit. and For. Med. Rev.*) thinks, ingeniously proved, that the mortality of children in London has progressively diminished for the last century; but no practitioner, who has had much experience among the poor, will be surprised to find that still twice as many children perish in London as in the country.

They are chiefly young persons from the country, between the ages of fifteen and twenty-five, when emigration into cities is greatest, that furnish the Paris hospitals with cases of typhus fever: out of 133 patients observed by Louis, only 4 were born in Paris. 26 out of 63 patients, who had been in Paris less than ten months, died; while of 56 who had lived there longer, only 16 were lost. I well remember the invariable question asked by L. Lerminier, at the Charité Hospital,

* Brit. and For. Med. Rev., Vol. XI., p. 430.

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when, on his morning round, he saw for the first time a young person with typhoid fever: "How long have you been living in Paris?" A city is a foreign climate to a countryman.

Seasons.—Under this head we must study *temperature*, as affecting the probability of longevity. It is now a well ascertained fact, indeed a law, which, by the bye, people generally and parents especially seem determined to disregard, that cold exerts a most pernicious effect upon animal life, but in a peculiar degree on the young and those of a tender age. MM. Villermé and Edwards formally directed public attention to the great mortality among children in cold seasons; and indicate some special and adventitious aggravations, which might be, as I understand they were in some places, obviated by the proper authorities, viz: the carrying children, sometimes to a distance, from their home to be christened, during the winter season, in churches which were damp and cold. Dr. Lombard, of Geneva, confirms the accurary of the opinions of the writers just mentioned, on the main points, while he offers some amendments on others of a secondary moment. Cold is uniformly unfriendly to the young of all animals. How cruel, with a knowledge of these things, must the conduct of so many parents appear, whose culpable vanity causes them to expose the breast and arms of their children without covering, in cold and inclement weather. To a similar cause must we often look for fatally developing tuberculous disease in adult females. In persons of advanced life, the same feature of the cause of mortality is evident; winter being the season which is most fatal to that class. Confirmatory of these views are the results of M. Quetelet's inquiries, based on

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statistical returns, for a series of years, for Belgium. They are as follows:

The following table exhibits at a glance the influence of seasons on mortality:

Months.	Deaths.		Proportion.	
1815 to 1826.	Towns.	Country.	Towns.	Country.
January,	59,892	116,129	1.158	1.212
February,	56,267	114,758	1.088	1.198
March,	54,277	114,244	1.050	1.192
April,	51,818	107,264	1.002	1.120
May,	48,911	93,714	0.946	0.978
June,	46,607	84,464	0.901	0.882
July,	45,212	77,555	0.874	0.809
August,	47,032	78,802	0.910	0.822
September,	50,191	85,131	0.971	0.888
October,	51,649	89,514	0.999	0.934
November,	52,908	89,585	1.024	0.935
December,	55,631	98,705	1.076	1.030
Average,	51,700	95,822	1.000	1.000

From this it appears that the fewest deaths take place at that period of the year when men have least to fear from the inclemency of the weather. This period coincides also with that during which most conceptions occur. It is clear that civilization can do much to modify these results.

M. Quetelet has furnished a very interesting table of the comparative mortality of different ages in each month, which we transfer to our pages.

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Table showing the influence of age and season on mortality:

Age.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
0 to 1 mo.	1.39	1.28	1.21	1.02	0.93	0.83	0.78	0.79	0.86	0.91	0.93	1.07
1 to 3	1.22	1.18	1.15	0.95	0.89	0.82	0.83	0.94	0.83	0.92	0.97	1.13
3 to 6	1.24	1.06	1.02	0.90	0.95	0.95	0.90	1.06	0.99	0.94	0.86	1.02
6 to 12	1.28	1.21	1.27	1.18	1.06	0.84	0.76	0.87	0.81	0.82	0.86	1.03
12 to 18	1.10	1.11	1.24	1.30	1.25	1.03	0.88	0.81	0.74	0.77	0.78	0.98
18 to 24	1.23	1.18	1.21	1.18	1.03	0.84	0.80	0.76	0.75	0.81	1.01	1.18
2 to 3 years,	1.22	1.13	1.30	1.27	1.12	0.94	0.82	0.73	0.76	0.78	0.91	1.01
3 to 5	1.23	1.16	1.26	1.29	1.13	0.94	0.78	0.74	0.73	0.79	0.89	1.05
5 to 8	1.29	1.17	1.32	1.24	1.20	0.96	0.78	0.74	0.76	0.75	0.85	1.02
8 to 12	1.08	1.06	1.27	1.34	1.21	0.99	0.88	0.82	0.81	0.76	0.80	0.96
12 to 16	0.95	0.95	1.14	1.14	1.19	1.04	0.97	0.95	0.96	0.81	0.86	1.04
16 to 20	0.93	0.94	1.07	1.18	1.15	1.03	1.00	0.99	0.89	0.87	0.95	1.01
20 to 25	0.97	1.00	1.09	1.02	1.09	0.96	0.90	0.92	0.96	0.95	1.03	1.11
25 to 30	1.05	1.04	1.11	1.06	1.02	1.02	0.91	0.96	0.95	0.93	0.97	0.97
30 to 40	1.11	1.13	1.11	1.04	0.99	0.92	0.85	0.94	0.99	0.95	0.94	1.03
40 to 50	1.17	1.15	1.13	1.05	0.99	0.86	0.86	0.94	0.93	0.87	0.95	1.11
50 to 65	1.30	1.22	1.11	1.02	0.93	0.85	0.77	0 85	0.89	0.90	1.00	1.15
65 to 75	1.43	1.32	1.18	0.99	0.91	0.77	0.71	0.80	0.88	0.86	0.98	1.17
75 to 90	1.47	1.39	1.16	1.01	0.87	0.77	0.67	0.75	0.84	0.84	1.00	1.21
90 and above,	1.58	1.48	1.25	0.96	0.84	0.75	0.64	0.66	0.76	0.74	1.03	1.29
Average,	1.26	1.20	1.17	1.08	1.00	0.88	0.80	0.84	0.86	0.86	0.94	1.09

Sometimes the very reverse of diminished temperature or high heat will increase the mortality, but then, as an almost necessary accompaniment, there must be deficient ventilation or a close and almost stationary atmosphere. In our cities, and even towns of moderate size, in the United States, this combination exists, and is efficient for the production of a disease of great violence and considerable mortality, viz. summer complaint of children or *cholera infantum.* This is particularly severe and frequent in children who have been recently weaned, and who are in their first dentition.

Dr. Emerson presents the subject, as far as relates to Philadelpha, in the following table, for a period of five years; the months being *equalized,* and exhibited in

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the order of their mortality, with their respective proportions.

	Under 1 year.	Between 1 and 2	Between 2 and 3	Between 5 and 20	Totals.
1. July,	836	249	117	120	1322
2. August,	546	317	120	165	1148
3. September,	377	221	140	185	923
4. June,	510	148	84	105	847
5. February,	382	109	123	131	745
6. October,	324	127	117	153	721
7. March,	322	119	122	138	701
8. April,	342	107	125	122	696
9. December,	269	90	114	135	608
10. November,	267	90	114	132	603
11. January,	281	81	102	109	573
12. May,	250	98	107	107	562
	4706	1756	1385	1602	9449

It hence appears, that by far the greatest mortality occurring in childhood takes place in June, July and August, months distinguished from all others by their high temperature, and that heat is the great enemy of early life in our city. It is interesting to observe that the destructive influence of this agent has lost much of its power after the first year of life, and that after the second year it is scarcely perceptible, there being but little variation in the columns representing the monthly mortality after this period.

There is another state, or combination of states, of earth and air, designated with more brevity than accuracy by the term malarious, which prevails in so many parts of the United States, and modifies not a little,—we ought rather to say, offers a contrast with, the deductions obtained in northern Europe, where, either the fevers of imputed marsh origin never prevail, or the degree of cultivation and civilization has carried them

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beyond it. We, here, can still retain that part at least of Celsus's opinion, of the healthy and unhealthy seasons, in which he designates autumn as *longè periculosissimus*, or by far the most sickly.

In England, the deaths registered in London, in the winter quarter of 1838, amounted to 15,611; in spring, to 13,109; in summer, to 11,397; and in autumn, to 1,581.

Great importance has been attributed to climate and season as physical causes of suicide, in the sense at least in which they were supposed to act, but without adequate reason. Mr. Winslow* points out the fact, that in Holland, the climate of which is much more gloomy than that of England, there are fewer suicides than in the latter country; whilst in France, more favourably circumstanced on the score of a friendly sky, there are more instances of this catastrophe. The average number of suicides in England, shows the months of April and June to have the preference; and November, the almost privileged month—with its fogs and its gloom—for a man to hang himself, exhibited the fewest. The proportion of suicides in November is, to those in April, as 3 to 8½. At Paris, the larger number of suicides occur in spring and summer. "When the thermometer of Fahrenheit ranges from 80° to 90°, suicide is most prevalent." An inference that might be drawn from this fact,—that self-murder must be common in hot climates, would be decidedly erroneous. On the contested point; which people, the English or the French, is most addicted to suicide, the author says:—"It has clearly been exhibited, that where there is one suicide in London there are twelve in Paris." We do not find,

* Anatomy of Suicide.

however, in Mr. Winslow's volume, the data which justify this assertion.

Occupations and professions.—Within a few years past, numerous and valuable results from statistical inquiries have been presented respecting the proportionate longevity of persons engaged in different kinds of labour, trades and professions. I must regret that my limits will not allow of the introduction of many tabular statements on this head. I shall, however, indicate some of the chief points worthy of notice.

All persons, whose employments require them to be long confined in a closely ventilated apartment, suffer in health, and if they persevere in this kind of exposure, their lives will be considerably abridged. The evil is increased by a constrained or bent posture and the inhalation of particles of matter escaping from the materials of their work. Under this description of persons will be included a large number of those engaged in manufactories and the work shop, in which floating particles of wool and cotton or impalpable dust and powder continually escaping, are continually taken into the lungs of the operatives and artisans or labourers, as the case may be. Those working in metals or in fusing, welding, and alloys, and in the manufacture of certain metallic preparations, are also greatly exposed to suffer in various ways. To these deleterious causes are too commonly added a protracted period of work, without interval of rest or benefit of fresh air, and often without adequate food. A class who are still greater sufferers, victims, from the combined operation of these various agencies, are those of tender age, mere children, who work in the factories for a diurnal period far beyond their strength. And, as if these were not enough for all human endurance, intemperance is brought in to complete the ac-

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cumulation of misery and aggravate ten-fold all the disasters following in the train of such a state of things.

"The grand bane," says Thackrah,* "of civilized life, is *intemperance.* Greater in towns than in the country, it dreadfully aggravates the evils of our employments; and it produces evils of its own ten-fold more urgent, more rapid, and more deadly. Not a class of artisans, and scarcely one of professional men is to be found, in which intemperance may not be discovered. Sometimes it is grossly apparent,—often partially concealed; in the first case, as it were, taking the constitution by storm; in the latter, proceeding by sap; in both, utterly destroying health, personal comfort, and domestic happiness." As illustrative of the effect of malt liquors in prompting those who use them to stronger potations, I give Mr. Thackrah's language in continuation of the above extract. "The most striking effects are to be seen among the artisans. The man takes, during the hours of labour, more drink than he requires, and this generally the compound sold under the name of ale. Instead of spending the evening with his family, he joins frequently some friends to take a pint at the public house. To ale, a glass of spirit must afterwards be added. At length he is frequently drunk at night; and in the progress of the case, we find him occasionally so unfit for work the next morning from disordered stomach, that he must have some spirit before he can crawl from his house. One glass leads to a second, and the man becomes intoxicated even in the morning,—is obliged to give up the idea of going to work,—and then his habits and feelings lead him to spend the day, not in freeing his

* The Effects of the principal Arts, Trades, and Professions, and of Civic states and habits of living, on health and longevity.

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system from the effects of his debauch, not in abstinence, fresh air, and repose, but in aggravating the evils from which he suffers. He spends the day in the public house! To-day is a repetition of yesterday, and to-morrow will probably be spent in sickness and in bed."

Are the above enumerated evils of confinement and hard labour, deficient food and yet inordinate stimulus, confined to England? Alas! no. The French have similar experience in their manufactories in Alsace, and in the northern departments. M. Villermé,* in his description of the number and necessities, indigence and vices, of the workmen at Lille, cites a deplorable fact which speaks volumes in illustration of the habits of these people. When the women are thus corrupt, we know in what an abandoned state the men must be. It is a custom at Lille to give to children whom it is desired to put to sleep a dose of theraca called '*sleeper*,' (*dormant.*) M. Villermé ascertained, by inquiring at the apothecaries who sell these *sleepers*, that the wives of the operatives buy them, especially on Sundays, Mondays, and holidays, when they propose to remain a long time at the tavern, (*cabaret*,) and to leave their children at home. Now, we would ask whether in our own once drunken and still too intemperate land, there was ever or is such systematic depravation of all maternal feeling, such lamentable vice, the direct product of drunkenness, among women in the United States, as this fact reveals of a portion of those of France.

The vice of drunkenness is, as M. Villermé assures us, of ancient date in this part of France. M. de Boulanvilliers, intendant-general, wrote, more than a century and

* Tableau de l'etat physique et moral des ouvres employés dans les manufactures de coton de laine et de soie. Paris, 1840.

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a half ago, respecting the people of the province of which the department of the North at this time constitutes a part—"They are punctual at mass and sermon, but without neglecting the tavern, which is their ruling passion." Let us not in the overfulness of Protestant zeal exclaim against this inconsistency among Catholics of olden time, until we can say that within the memory of men now living there was not a counterpart to this picture in the conduct of many a pious Presbyterian and Methodist, not to say Episcopalian, whose punctuality on attendance at church was only equal to, it could not surpass, his punctuality of visits to the liquor bottle, and the animation of whose devotions was often a suspicious compound of honest zeal and the excitement of alcohol. Ought any Christian of any church to throw himself open to this imputation? Can the unbroken records of any church be adduced to prove that the imputation is unfounded?

To show how the moral system, when pursued conjointly by the employers and the employed, operates on the health and prosperity of all, we have only to contrast the foregoing pictures of French and English manufactures, and I have withheld many of their worst because coarsest and most revolting features, with those of American manufactures; taking the "Lowell girls" as not too high or an exceptional standard on the occasion.

Military life, even in peace, is everywhere adverse to longevity. I shall not cite any farther proof of this fact than by introducing the following short article, which is fully to the point.

"A very interesting discussion took place recently in the Chamber of Deputies on the question that the annual levy of 80,000 conscripts for the year 1839 be authorised. Col. Paixhans, from documents to which he referred,

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refuted the statement in the report of the Committee to which the measure had in its usual course been submitted, that the military profession was in time of peace favourable to the preservation of the health of the men, (those engaged in it). On the contrary, he showed that the annual mortality among young men of 20 years of age engaged in civil pursuits was only 12 in 1000; and among those of 27 years of age, similarly occupied, 14 in 1000. Now, the mortality in the ranks of the army was much more excessive. Among the non-commissioned officers it was 11 in 1000; among the senior soldiers (those of from 26 to 27 years of age) the deaths were 20 in 1000 per annum. Among those who were only five years in the service (they commence at 20 years) the mortality was 30 in 1000; among those who were four years in the army it was 45 in 1000; among those of three years it was 52 in 1000; among those of two years it was 65 in 1000; and among the young soldiers, those in the first years of service, the mortality was 75 per 1000. He added, that the annual mortality among the veterans in the Hotel des Invalides was 50 in 1000; among the troops in the colonies 70, and among those in Algiers 80 in 1000."

Of the conditions in life and modes of living, *marriage* seems to be favourable to longevity. Dr. Casper, in corroboration of the opinion of Hufeland and Departieux, has exhibited, in a series of tables, the gain to life which marriage has, for both sexes, over celibacy. (*See Ann. d'Hygiene*, &c., t. XIV.) The greater probability of married men over single ones between thirty and forty-five passing this latter term, taking 100 of each for comparison, is 36.8. As life advances, the chances are still greater; as it would seem that for eleven bachelors who live beyond seventy years, we find twenty-seven mar-

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ried men who go beyond, taking equal numbers at anterior and early dates for comparison.

In the female sex, the gain on the score of longevity is not so great as in the case of men; but it is still quite apparent. Of 100 women who pass seventy years, the number of unmarried is 23.6, and of married women, 28.7.

Among the chief causes which, after birth, tend to cut short life, are deficient food, want of common air and exercise, and the consumption of alcoholic liquors, and particularly of ardent spirits.

Under the head of deficient food, is the privation to the infant of its mother's or a good nurse's milk, and its being reared by artifical means. The trials of this nature, especially in public or charitable institutions, have been most disastrous. In the month of February, 1822, twelve infants were confided to women destined to feed them by the bottle or the spoon. In the very first week after their arrival, all died except one, who, being three months old, was better able to bear the trial. At Parthenay, out of 153 foundlings, in a period of five years, there died of these, from the age of one day to a year, 54, which is 35 per cent. At X——, out of 244 children, there died, in the course of a single year, 197, which is 80 per cent. The difference in the mortality in this case arose from the mode of feeding the children. At X——, no child was nursed at the breast—all were raised by hand. In other respects, the care and attention paid at the two places was the same. The greatest mortality was within the month, and of this the greatest was in the summer months. In July and August, the deaths were 36 out of 48 children, (75 per cent.) In January, February and March, 18 out of 71, (25 per cent.) At Rheims, the mortality among the foundlings

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raised by hand, was, in 10 years, ending 1835, 586, in the first year of life, out of 916 admitted in the hospital, or at the rate of 639 in a thousand. At Paris, it was 503 in a thousand, in the same period or the first year of life. (*Ann. d'Hyg*. t. XIX.)

The mortality among the foundlings generally, in France, was represented by M. Benoisten de Chateauneuf, in 1824, to be three-fifths, in 60 per cent. in the first year after birth.

In private life, and in separate houses, we do not meet with such a terrific proportion of deaths in children fed by hand, as the above returns exhibit; but still, even with the greatest care and skill, the risk is too great to be incurred, if a wet nurse can possibly be procured for the child.

In many parts of Europe, the population is diminished by a deficiency, and in very many cases, positive privation of food for common sustenance. The Register General's Report of the mortality, &c., for England, contains a number of cases of this kind. Stinted allowance, however, and feeble health, are not insurmountable obstacles to occasional instances of longevity: nor is drunkenness itself always a preventive of this result. There is in some persons a tenacity of life which common causes are relatively powerless in affecting. But let us beware how we take these exceptions, these exempts from the common lot, survivors in the forlorn hope, after being exposed to a murderous fire from the breach, as examples for our guidance. Even in sickly countries, where the average duration of life is very low indeed, we meet every now and then with instances of longevity; and it is a curious fact, that in certain places in which careful records have been kept for a long time, as in Geneva, for example, the instances of great or re-

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markable longevity are fewer, in proportion, as the mean life of the people at large increases.

Physicians and medical statists are not well agreed respecting the real influence which *vaccination* has exerted on mortality, and the consequent chances of longevity. Two extreme views have been taken of this subject. The opposers of vaccination, at least its detractors, and those who underrate its value, after stating that although smallpox has fewer victims, yet that measles, scarlet fever, hooping cough, croup and cerebral diseases carry off more children than formerly, draw the illogical inference that vaccination aggravates the violence of these diseases, if it does not actually originate them. These persons forget that a child, vaccinated soon after birth, and prevented by this means from perishing by small-pox, still remains liable to all the attacks of other diseases—and hence, that, in fact, vaccination, by increasing the entire number of children, places a large number to be attacked by other diseases, and as the number is larger, the deaths, at the usual rate, will be greater.

Others fall into an opposite error, and claim out of the entire number of children vaccinated, all those who would have otherwise perished by smallpox, as so many lives saved for future usefulness in the arts, sciences, and productive labour of a country. They overlook the fact entirely, on which their opponents put a wrong and exaggerated construction, that vaccination, although it saves life from the attack of smallpox, is not a guaranty against the diseases of childhood, but that the vaccinated, as well as those who have not been, or of those who may have survived an attack of smallpox, are equally liable to these diseases. "When we read, or hear it said," says Mr. Say, "that vaccination, by preserving the life of a hundred thousand persons, has

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added a hundred thousand souls to our population, we may smile at the error, and yet, nevertheless, applaud the discovery [vaccination] itself."

The question is every now and then asked, indeed it is one which sometimes comes before a court of law, what effect has *insanity* on the mean duration of life, or how far does it tend to prevent, if at all, longevity? Mr. Farr, whose zeal in the cultivation of medical statistics is so well known, and whose name has been so often introduced in connection with this subject in the present chapter, has lately instituted inquiries and made some estimates, calculated with a view of answering the question. I have no room for his observations on different lunatic asylums in England, but shall give the chief results. He says: "We have no means of ascertaining the mortality of lunatics at large; but the mortality of lunatics in asylums is much higher than the mortality of the general population, and the excess cannot be ascribed entirely, although it may partially, to the confinement, the unwholesomeness, or the usages of madhouses. The mean age of lunatics in asylums is about 35–40. The average age of the patients admitted at Bethlem, (1830–34,) was 36 years (36·2); and the mean age of 213, admitted at Hanwell, by Dr. Conolly, was 36½. The mortality at the age 30–40 is 1·2, and at 40–50 is 1·5 per cent. in England and Wales. In cities, the mortality, at a corresponding age, is not more than 2 per cent. annually. Now the annual mortality at Bethlem, where dangerous cases are carefully excluded, was 9 per cent., in 1827–39. At Gloucester, one of the county asylums, at which the treatment is most successful, the diet is generous and nutritious, and the patients live, as much as possible, in the open air,—the annual mortality is 7 per cent."

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The relative mortality of *different nations* has been variously estimated. The following, of some of the principal ones, may be regarded as tolerably accurate approximations to the real fact, if not its direct exponents. The absolute mortality of the Russians, was, within the last twenty years 1 in 27; the Prussians 1 in 36·2; the French 1 in 39·7; the Dutch 1 in 38; the Belgians 1 in 43·1; the English 1 in 43·7; the Sicilians 1 in 32; the Greeks 1 in 30. We have no estimate of the mortality of the people of the United States. In Philadelphia, the annual mortality is 1 in 42·3; in Boston, 1 in 45; in New York, 1 in 37·83.

As confirmatory of the remark made a few pages back, that neither the average duration of life, nor the rate of mortality, presents an idea of the individual cases of longevity, and that these may be found where the mean is low, we may instance Russia. In that country, there are a considerable number of old persons, but yet the mortality in early life is excessive. Thus, in the diocese of Nisni Novgorod, it appears that of 1000 baptized, 661 perished before their fifteenth year. It is evident, therefore, that a large number of births in a country does not give proof of a numerous adult population, nor of the chances of longevity among them being greater than where the proportion of births is much less. Mr. Rickman, on this subject, among many observations of the same nature, tells us:—In the North-Riding of the county of York, one-half are not dead until the age of thirty-eight years, whereas, in the West-Riding of the same county, one-half are dead at 18 years of age. An incredible disparity in adjoining districts, were it not known that the population of the North-Riding increases slowly, that of the West-Riding rapidly. It may as well be added, in elucidation of the problem in this case,

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that the West Riding of York, in which the probability of life is so little for newly born children, is one of the most manufacturing districts in England, while the North Riding, in which children have a better chance of life than in the rest of England, is agricultural, and one of the most thinly inhabited. Elsewhere, Mr. Rukman remarks: "Such, indeed on infant life, is the effect of crowded residence in the immediate vicinity of the several factories, that in Lancashire 36 per cent. of male infants, 31 per cent. of female infants, die before they are ten years old. A rapid increase of population infers the birth and existence of a large proportion of infants, and therefore a large proportion of short lived persons, thereby accelerating, *pro rota*, the time or age at which one-half of the population, collectively, are dead."

THE END.

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ERRATA.

Page 74,	line 14 from top,	*for* corn-bread	*read*	bread-corn.
" 76	" 4 " "	" "	"	"
" 99	" 22 " "	" *Convolvolus*	"	*Convolvulus.*
" 129	" 21 " "	" *Fugopyrum*	"	*Fagopyrum.*
" 137	" 11 " "	*dele* the comma after quantity.		
" 173	" 11 " "	for *Muscula* read *Mascula.*		
" 180	" 12 " "	" seed weeds *read* sea-weed.		
" "	" 17 " "	" *blanc mange*	"	*blanc-manger.*
" 254	" 18 " "	" *auno*	"	*anno.*
" 325	last line	" *Compestus*	"	*Conspectus.*
" 420	line 7 from top	" Rukman	"	Rickman.
" "	" 14 " "	" *rota*	"	*ratâ.*

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